June 1944

TECHNOLOGY REVIEW

Title Reg. in U. S. Pat. Office

technology
review
Published by MIT

This Book tells you

Many Things You Want to Know About SPEED REDUCERS

. . . with special emphasis on the Completeness and Engineering Excellence of the WHS LINE

"First Speed Reducers in America to be Shipped From Stock"

THE new WHS Engineering Manual and Catalog No. 144 approaches the authority and completeness of a text book. Practically any question you might ask about Speed Reducer design, ratio range, horsepower and torque ratings . . . in the wealth of sizes and styles covered by the WHS line . . . is answered in this book.

It gives helpful information on selecting your reducer . . . construction . . . overhung loads . . . lubrication . . . chain pull factors . . . flexible couplings . . . and includes an especially valuable and complete Engineering Section containing many widely used formulae, tables and charts.

To obtain a copy, simply address us on your business letterhead, stating your position.

CUTTER P. DAVIS, M.I.T. '19, *President*

WINFIELD H. SMITH, Inc.

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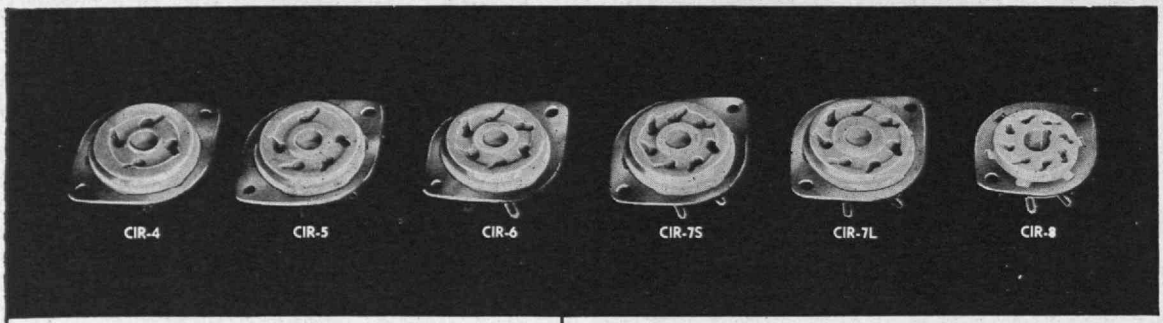
THE TECHNOLOGY REVIEW, June, 1944. Vol. XLVI, No. 8. Published monthly from November to July inclusive at 10 Ferry Street, Concord, N. H. Publication date: twenty-seventh of the month preceding date of issue. Annual subscription $3.50; Canadian and Foreign subscription $4.00. Entered as second-class matter at the Post Office at Concord, N. H., under the Act of March 3, 1879.

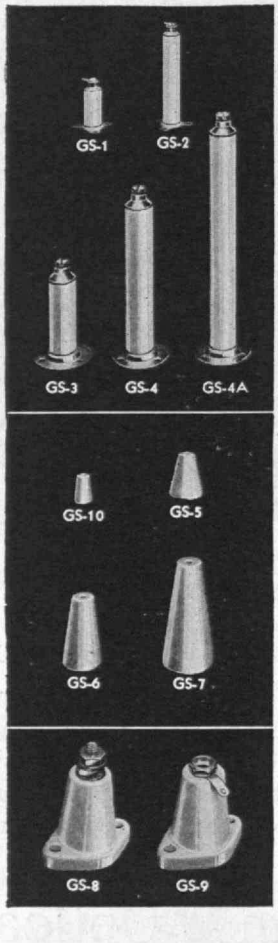
NATIONAL LOW-LOSS SOCKETS AND INSULATORS



CIR Series Sockets

Any Type **List $ .45**

Type CIR Sockets feature low-loss isolantite or steatite insulation, a contact that grips the tube prong for its entire length, and ring for six position mo... supplied with two met...



GS-...

GS-...

GS-3...

GS-4, ...

GS-4A, ...

Cylindri... standoff ... plated cap...

GSJ, (not i... A special ... top threade... diameter insu... & GS-4A.

GS-5, 1¼" **List, each $ .40**

GS-6, 2" **List, each $ .70**

GS-7, 3" **List, each $ 1.25**

GS-10, ¾", package of 10 **List $ .12**

These cone type standoff insulators are of low-loss steatite. They have a tapped hole at each end for mounting.

GS-8, with terminal **List $ .90**

GS-9, with Jack **List $ 1.25**

These low-loss steatite standoff insulators are also useful as lead-through bushings.

AA-3 **List $ .60**

A low-loss steatite spreader for 6 inch line spacing. (600 ohms impedance with No. 12 wire.)

List $ .50

...steatite aircraft-...lator.

List $ .90

...ose strain in-...ss steatite.

...st, each $ .20

...tite bushing

...f ten $ .85

... Victron.

...zen $ .85

...e bush-...93 con-... diam.,

$ .55

.75

...n-...n-

XS-1, (1" Hole) **List $ 1.20**

XS-2, (1½" Hole) **List $ 1.35**

Prices listed are per pair, including metal fittings. Insulation steatite.

XS-3, (2¾" Hole) **List $ 6.00**

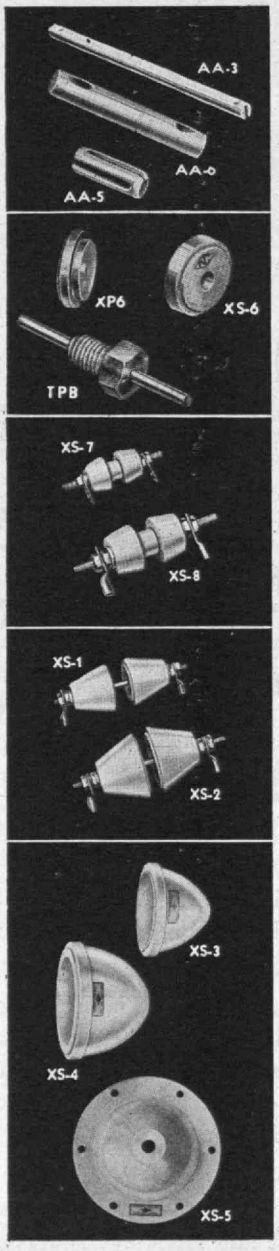
XS-4, (3¾" Hole) **List $ 7.25**

Prices are per pair, including metal fittings. These low-loss steatite bowls are ideal for lead-in purposes at high voltages.

XS-5, Without Fittings **List, each $ 8.25**

XS-5F, With Fittings **List, per pair $17.00**

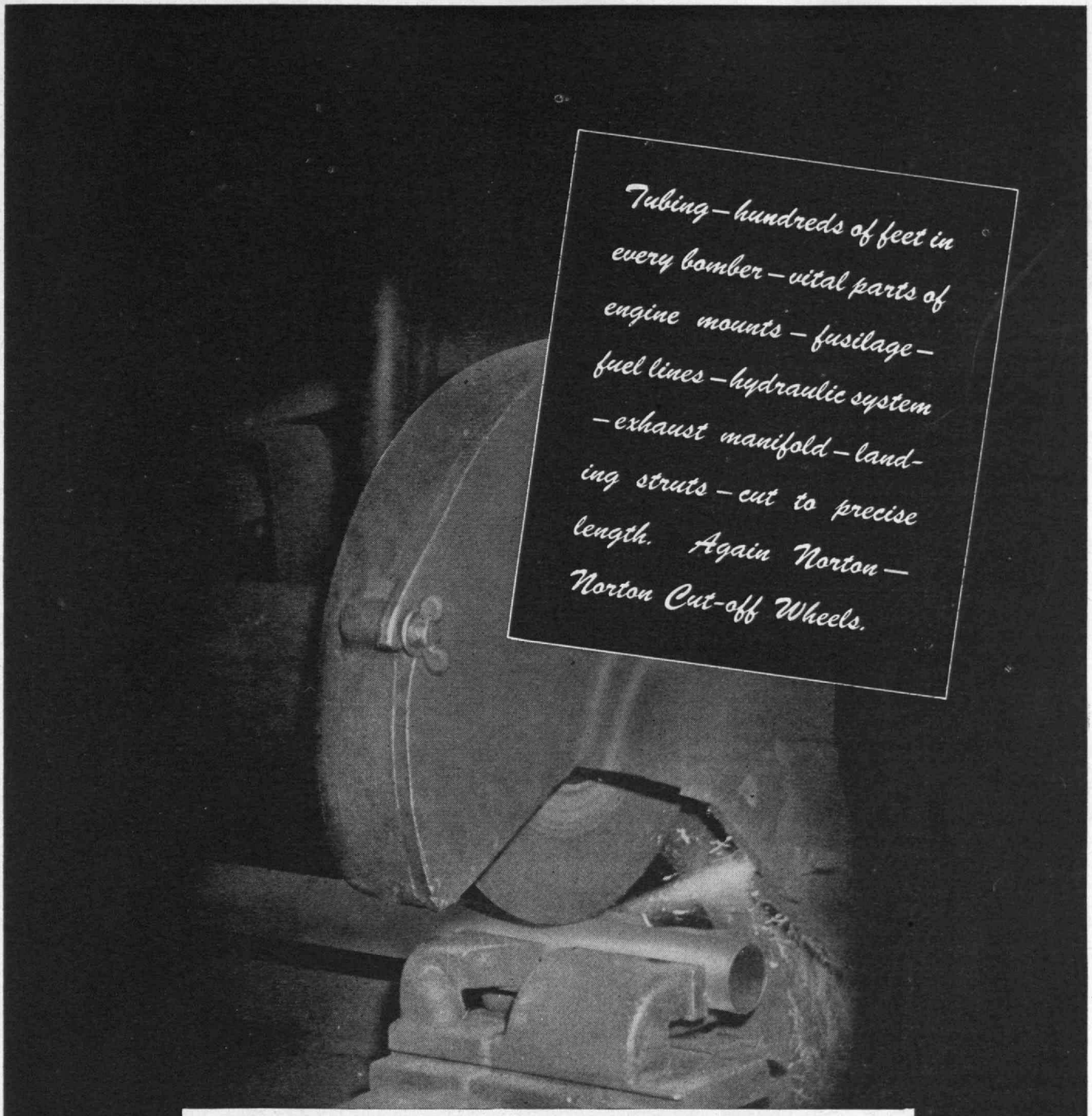
These big low-loss bowls have an extremely long leakage path and a 5¼" flange for bolting in place. Insulation steatite.



MEMO

National is still your best bet for high grade parts for H.F. Communication work. Deliveries are good when orders are covered by suitable priority rating.

NATIONAL COMPANY, INC.
MALDEN, MASS.



Cutting-off with Norton Resinoid Abrasive Wheel

Thousands of sharp abrasive cutting teeth go into action at a surface speed of 16,000 s.f.p.m.—resinoid bonded by special Norton-developed formulas.

Yesterday—cutting-off was hardly more than a tool room or stock room application.

Today—cutting-off is a high speed production on many kinds of materials—steel, brass, aluminum, ceramics, plastics, insulating materials, glass, cemented carbides.

Norton Abrasive cut-off wheels not only cut costs but they save time—and time was never more precious than now.

NORTON COMPANY, WORCESTER 6, MASS.

Photo courtesy North American Aviation, Inc. Behr-Manning, Troy, N. Y., is a Norton Division

NORTON ABRASIVES

"PUT IT ON THE BLANCHARD"

CHECK THESE ADVANTAGES OF BLANCHARD GRINDING

- ★ **Production**
- **Adaptability**
- **Fixture Saving**
- **Operation Saving**
- **Material Saving**
- ★ **Fine Finish**
- ★ **Flatness**
- ★ **Close Limits**

★ . . . . . *Especially valuable on jobs like the one illustrated.*

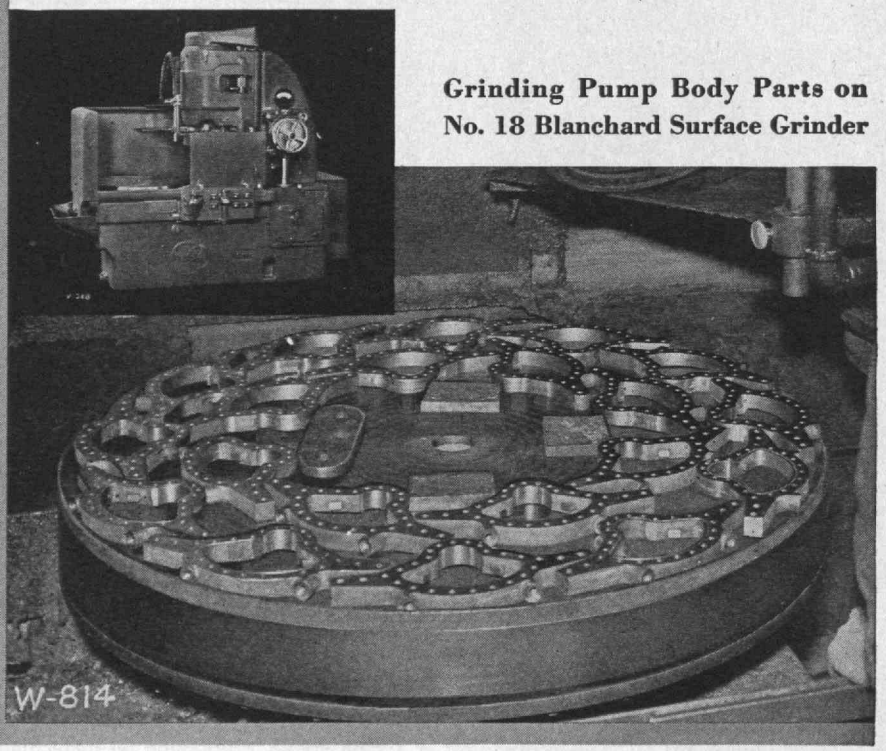
THIS is an excellent example of accurate surface grinding of pump body parts on a No. 18 Blanchard Surface Grinder.

These pump parts are held magnetically on a 36" chuck and work is held to very close limits giving a finish suitable for final lapping operation.

The material is high strength forged steel and .004" is removed from each side, to limits of .0003". Forty pieces 10⅝" long, 5⅛" wide and .756" thick (80 surfaces) are produced per hour.

The BLANCHARD MACHINE COMPANY

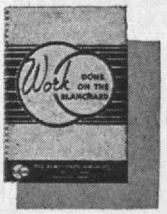
64 STATE STREET, CAMBRIDGE, MASS.

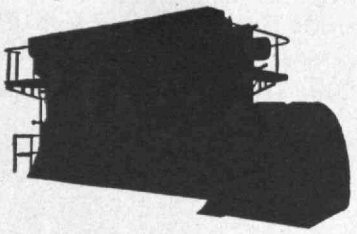


Grinding Pump Body Parts on No. 18 Blanchard Surface Grinder

BLANCHARD

Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.





Your order now will make for

POST-WAR ORDER IN INDUSTRY

Like any other good American organization, Busch-Sulzer stood by for orders from Washington after December 7, 1941. Since then, we have been working 'round the clock on Diesel engines or war materials for the Army, Navy and Maritime Commission and on engines for high priority. We intend, of course, to continue doing so until Washington says that the "end of the beginning" has turned definitely into the beginning of the end.

When peace comes, it is vital that America keep as many of its workmen busy as is possible. Some industries cannot escape labor layoffs during the period of re-tooling. Not so the Diesel industry if . . .

The "if" means if it has work to do. The work should be there if the plans are well-ordered, because there is a great need for Diesels because of obsolescence, because of interrupted enterprises and enterprises planned. Little can be expected from Europe, some of whose Diesel plants have been bombed out of existence or badly damaged.

Busch-Sulzer has expanded its facilities greatly since 1941 and has increased its carefully trained personnel by 50 percent in the last 20 months. We are anxious to keep these men and machines busy and help to achieve the peacetime stability that all of us yearn for.

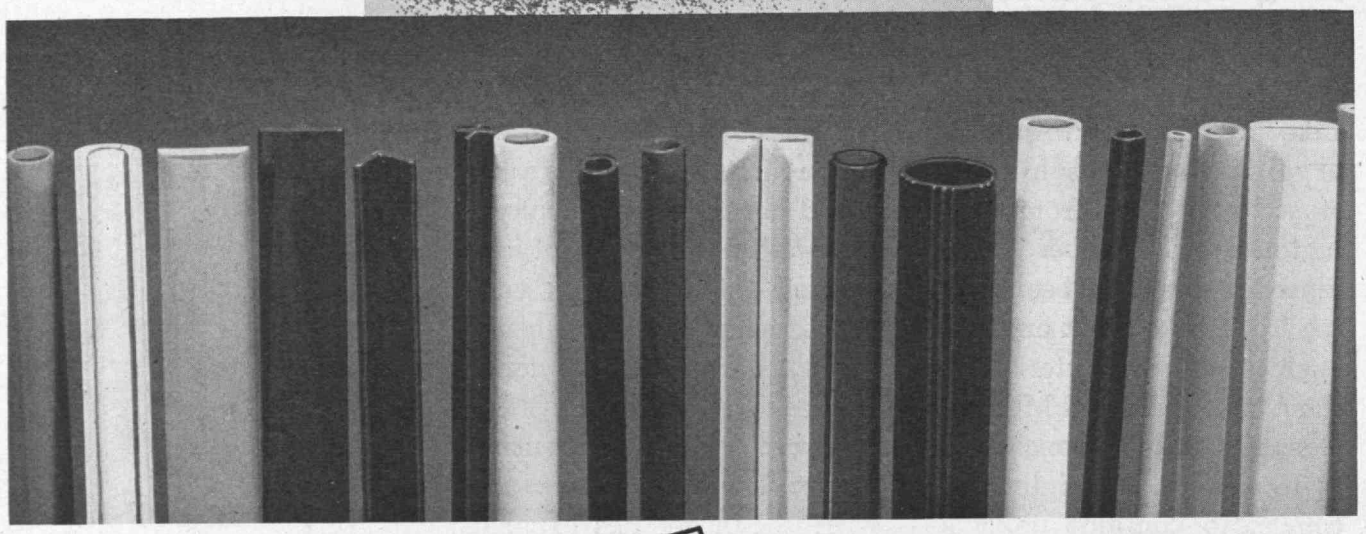
Please send us your inquiry now so that your requirements can be met without further loss of valuable time when capacity becomes available.

BUSCH-SULZER BROS.-DIESEL ENGINE COMPANY

SAINT LOUIS

AMERICA'S OLDEST BUILDER OF DIESEL ENGINES

BUSCH-SULZER
ST. LOUIS



SANDEE EXTRUSION EXPERIENCE Can Help Guide You in Proper Use of Materials

ELMER SZANTAY, M.E. '35, GENERAL MANAGER

IF YOU are not sure whether you are using the best available material for your extruded plastic sections, ask us about it now! Long experienced plastic engineers know all of the many characteristics of every known plastic extrusion material such as polystyrene, cellulose acetate butyrate, ethyl cellulose, polyvinyl chloride, vinyl chloride, vinyl acetate.

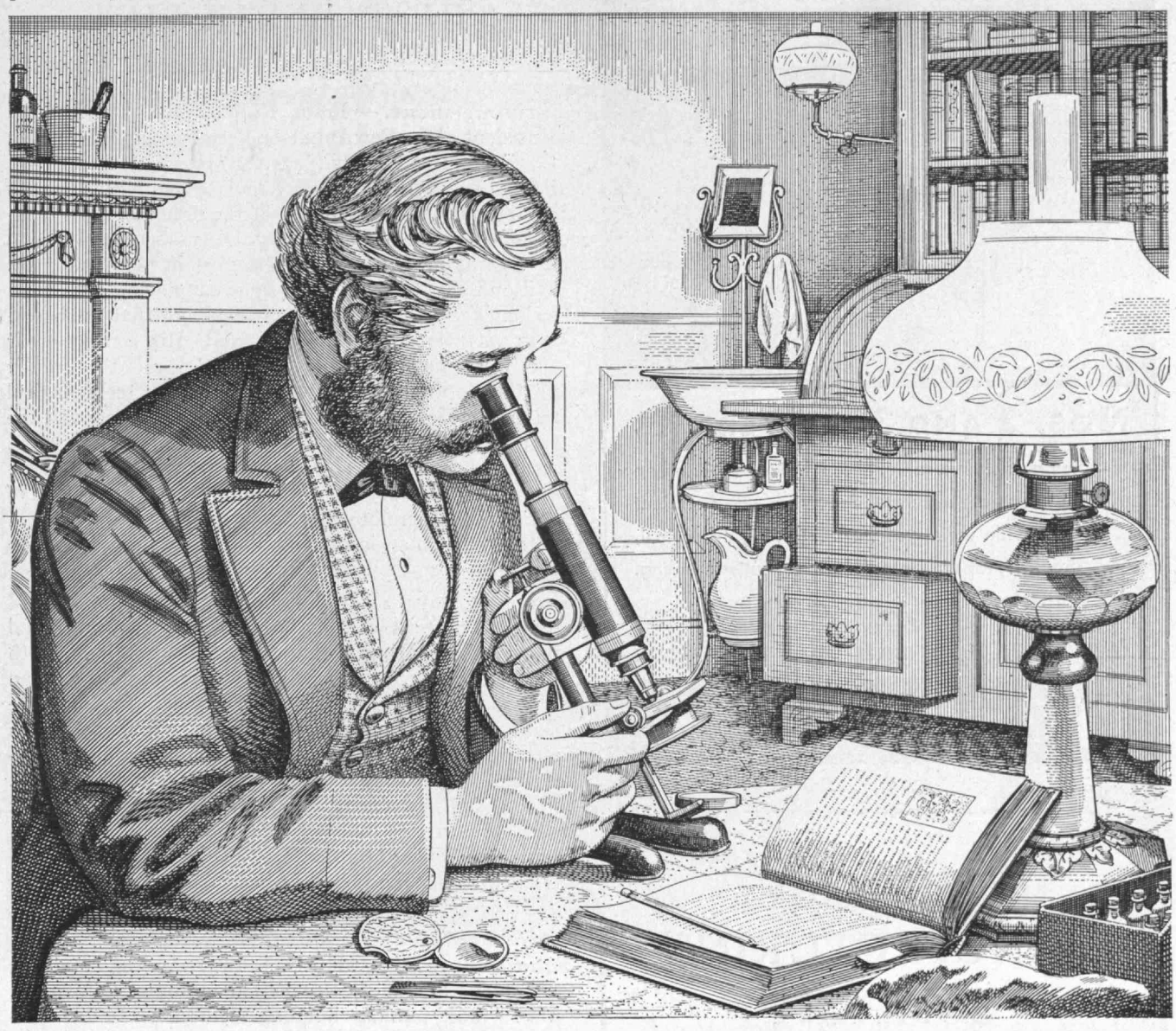
Correct recommendations call for information concerning the specific function of the extruded section; what mechanical, electrical, chemical or physical properties are required; and, whether material is to be of rigid or flexible type. The color, lengths and total footage needed, together with a drawing, sketch or model, are also essential information. The consistent success of Sandee Rigid and Flexible Extruded Plastic Sections reflect the skill of our staff in establishing accurate specifications, then producing sections to the very highest standards of quality and uniformity. Write us about your needs, now.

Sandee Manufacturing Company

3945 NORTH WESTERN AVENUE • CHICAGO, ILLINOIS

EXTRUDED PLASTICS AND SPECIAL TOOLS

BRING YOUR OPTICAL PROBLEMS TO HEADQUARTERS. Bausch & Lomb offers: 1. America's largest precision optical facilities. 2. Ninety years of optical engineering. 3. An Optical Scientific Bureau. 4. Its own optical glass plant.



The Microscope that Changed the Course of Science

BAUSCH & LOMB is at war. Most of the productive facilities of this company are devoted to manufacture of equipment essential to the war effort . . . from giant battleship range finders to microscopes for scientific research.

As reward for continuing production achievements, the Army and Navy have awarded B&L the Army-Navy "E" with four stars . . . the only such award in the optical industry.

Here you see one of the earliest of the Bausch & Lomb microscopes.

This was the first microscope produced by quantity production methods . . . the first precision compound microscope to be made at a price which the average research worker, educator or medical man could afford. These microscopes made research and study possible in America on an unprecedented scale.

Prior to this development of the mass production of precision optical instruments by Edward Bausch in 1876, the use of the microscope was restricted by high cost. Today the microscope is a familiar laboratory instrument in nearly every field of scientific endeavor.

With this rich background of experience, Bausch & Lomb makes the most complete line of optical instruments built by anybody anywhere, setting the pace in pioneering optical research, development and manufacture.

This is the experience that can be applied to the solution of your optical problems whether through a standard Bausch & Lomb instrument for research or control, or a completely new optical development for your specific needs.

BAUSCH & LOMB

OPTICAL CO., ROCHESTER, N. Y.

ESTABLISHED 1853

Makers of Optical Glass and a Complete Line of Optical Instruments for Military Use, Education, Research, Industry and Eyesight Correction and Conservation

THE TABULAR VIEW

Encouragement. — From ROBERT E. WILSON, '16, President of the Pan American Petroleum and Transport Company, this Review (page 483) presents a trenchant, hard-thought article well calculated to vitiate many gloomy prognostications about the industrial and technological future of the country. Discussing our situation as regards production and resources in petroleum, Dr. Wilson refers to the past to show convincingly that not so long ago things looked very black but that the blackness was very effectively relieved. His contention is that the same medium of relief can be counted on equally in the future, that the scientific and technological research which multiplied both proved resources and the rate of production from them can still be relied upon. As corollary, he stresses well the fact that for full realization of its potentialities, it must have freedom of action, and therefore that thoughtful people must look with doubt on social moves which may be expected to constrict it.

Era. — In days when the skillful and delicate art of making electrons work in dozens of ways plays a crucial part in the fighting of the greatest of wars, it is worth while to pause for consideration of how short a span the science of electronics has been in operation. We think readily of the first flight in a craft heavier than air; we remember with easy nostalgia the first automobile ride. Looking back in similar fashion, JOHN MILLS, '09, tells in this Review (page 486) the swift story of how electronics has developed since the invention of the audion by Lee deForest in 1906. Director of publication for the Bell Telephone Laboratories since its incorporation in 1925, Mr. Mills the author of a volume, *Electronics, Today and Tomorrow*, soon to appear.

Sandwich. — Steel, alloys, plastics — so the catalogue of much wartime construction automatically runs. Man's most familiar building medium is readily misconceived as usable only in boxes and crates for the materials of Mars. The degree of this error is plainly shown by ALBERT G. H. DIETZ, '32, in an article (page 489) discussing the speedy Mosquito bomber which has given such admirable account of itself over the Continent, and which, with its wooden wings, is fit successor to the wooden walls on which Great Britain in an earlier day depended. Assistant Professor of Structural Engineering at the Institute, Dr. Dietz has been a student of wood and wooden construction ever since his undergraduate days.

Gamut. — The electrical industry of the United States has been prolific in spectacular careers, so that not a few of its characteristic achievements are identified by the names of men. Throughout its course, moreover, the industry has benefited from the devotion and skill of other men whose work, fundamental and essential, has not been marked by drama. In these careers is many a story of human interest and industrial progress. One such is the story of Hermann Lemp, concluded in this issue (page 491) by DAVID O. WOODBURY, '21, biographer of Elihu Thomson and careful student of industrial history.

MAIL RETURNS

More and Less

FROM ARTHUR K. HUNT, '85:

Congratulations! The April Review is the best one I have ever seen — *many* interesting articles. I am probably wrong, but my feeling is that in The Review the articles are all too long. Personally I should prefer shorter articles and perhaps more of them. Am I a heretic?

Brookline, Mass.

Recognition

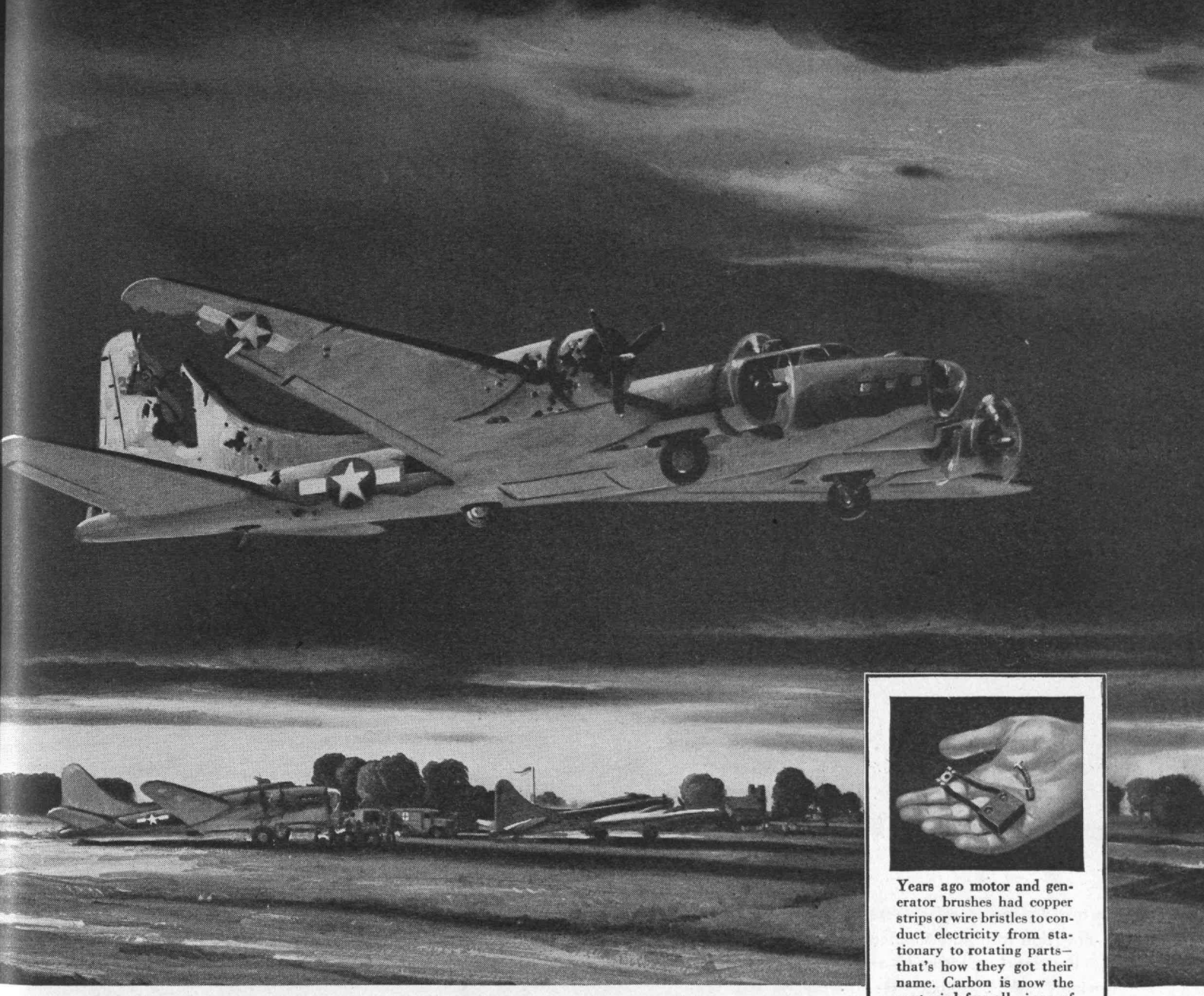
FROM DONALD R. STEVENS, '11:

Your two-part story by David O. Woodbury, '21, on Hermann Lemp, beginning on page 419 of The Review for May, was of great interest to me. Imagine my surprise at reading all that I did not know about Mr. Lemp. I anticipate the second installment with eager interest. On the Sundays when I go to church with Mrs. Stevens, we sit immediately behind Mr. Lemp. He is vigorous and sings lustily. We miss the little Mrs. Lemp, who has not been too well of late. Although Mrs. Stevens from time to time has told me that Mr. Lemp has many patents to his credit, I had no idea that we were enjoying proximity with such a great man. I had no idea that some of the equipment which we use with such wonderful effect in our plants today — particularly electric welding — can be traced to Mr. Lemp's ingenuity. . . .

Professor Comfort A. Adams dropped into my office just now to say hello. Professor Adams has been past president of the American Institute of Electrical Engineers and Gordon McKay professor of electrical engineering at Harvard University. I said: "Professor Adams, do you know Hermann Lemp and have you seen this article in The Review?" He said: "Hermann Lemp is one of the finest men that I ever knew — morally, socially, and civically. Few realize his accomplishments as an engineer. He put the Diesel engine on railroads. Fate decreed that for one reason or another he never received the recognition that was due to him. . . . I am very glad that at last a magazine such as The Review is paying him the honor that should be accorded him. I love him."

Professor Adams told me that Hermann Lemp had a steam automobile running long before the car was invented by someone else. He also told by way of anecdote that when Mr. Lemp was 70 years old he saw him swim the whole length of a swimming pool under water. He said that Mr. Lemp was the finest type of engineer and associate that anyone could possibly imagine; that he was always learning and always helping and yet with all his contribution to science, he asked for little reward and he received but little.

Ridgewood, N. J.



Years ago motor and generator brushes had copper strips or wire bristles to conduct electricity from stationary to rotating parts—that's how they got their name. Carbon is now the material for all sizes of these brushes.

THEY HELP BRING THE GIANTS HOME

ONE OF the "little things" that are contributing greatly to the safety and welfare of our fighting men, is a special kind of carbon brush used in high-altitude planes. These brushes are essential to the generators and motors that supply energy for the radios, firing apparatus, gun turrets, bomb bay doors, landing gear, and other equipment of the planes. A heavy bomber has more than 40 of these devices requiring brushes.

Ordinary brushes disintegrate in a few minutes at altitudes where the air is "thin" and dry. A brush that would be dependable from take-off to ceiling and would have a life of 100 hours or more—had to be found. It came from the laboratories of NATIONAL CARBON COMPANY, INC., a Unit of UCC.

Carbon is useful in many other ways to Americans at war. Therapeutic lamps, which employ the carbon arc, are helping to restore health to sick and wounded men. Activated carbon in gas masks, by absorbing toxic vapors, is ready to save lives.

In the two-way radio telephone—the walkie-talkie and the handy-talkie—and in hearing aids for the deafened, carbon has another role. Carbon is essential in the small, powerful batteries that are used in these devices.

▼

Teachers, designers, and operators of electric motors, generators, and rotary converters are invited to send for "Modern Pyramids" P-6. This is a series of pamphlets containing practical suggestions on the performance, characteristics, operation, and application of electric motor brushes. There is no obligation.

BUY UNITED STATES WAR BONDS AND STAMPS

UNION CARBIDE AND CARBON CORPORATION

30 East 42nd Street UCC New York 17, N. Y.

Principal Units in the United States and their Products

ALLOYS AND METALS
Electro Metallurgical Company
Haynes Stellite Company
United States Vanadium Corporation

CHEMICALS
Carbide and Carbon Chemicals Corporation

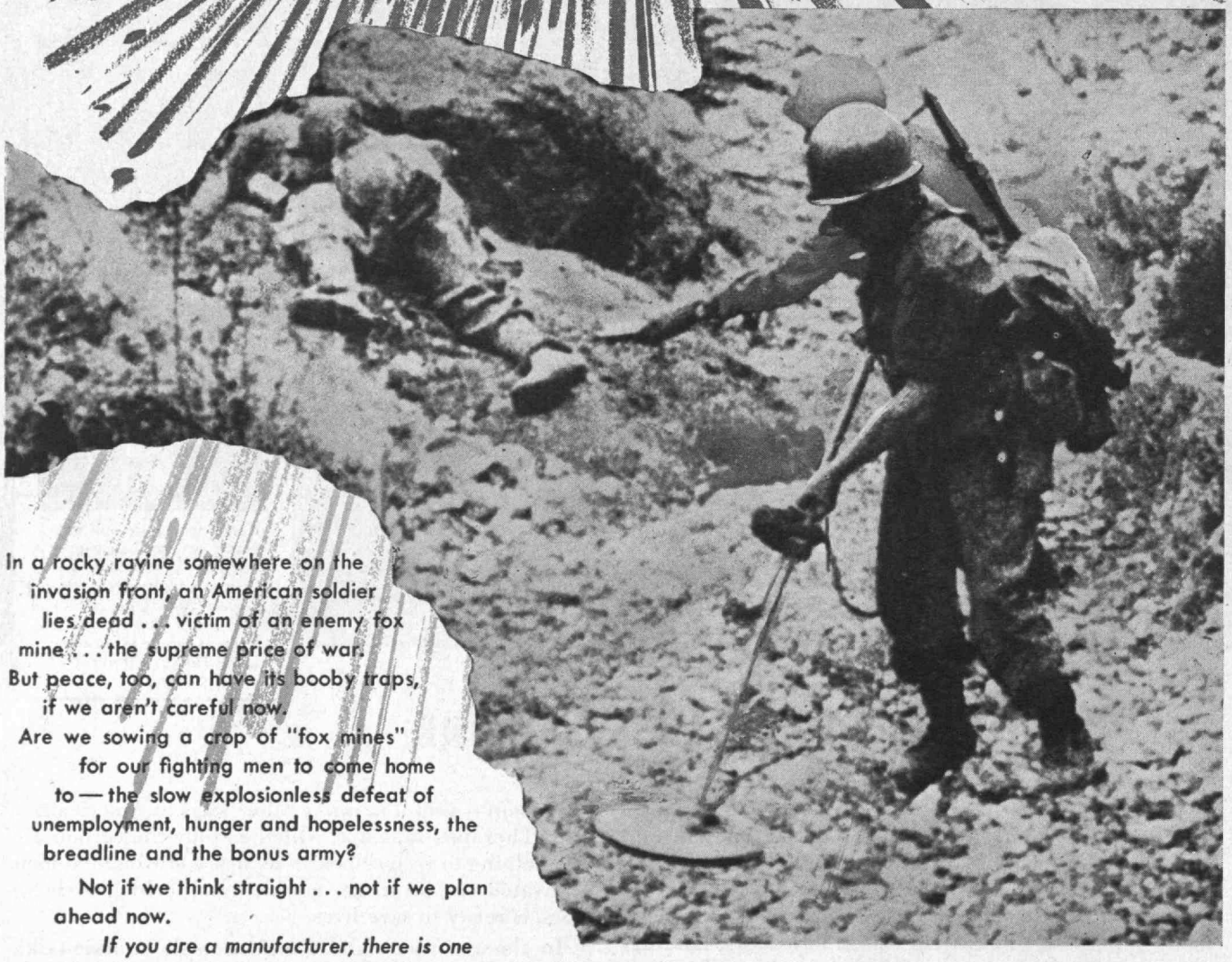
ELECTRODES, CARBONS AND BATTERIES
National Carbon Company, Inc.

INDUSTRIAL GASES AND CARBIDE
The Linde Air Products Company
The Oxweld Railroad Service Company
The Prest-O-Lite Company, Inc.

PLASTICS
Bakelite Corporation
Plastics Division of Carbide and Carbon Chemicals Corporation

Are we sowing a crop of peacetime

FOX MINES IN AMERICA?



In a rocky ravine somewhere on the invasion front, an American soldier lies dead . . . victim of an enemy fox mine . . . the supreme price of war. But peace, too, can have its booby traps, if we aren't careful now.

Are we sowing a crop of "fox mines" for our fighting men to come home to — the slow explosionless defeat of unemployment, hunger and hopelessness, the breadline and the bonus army?

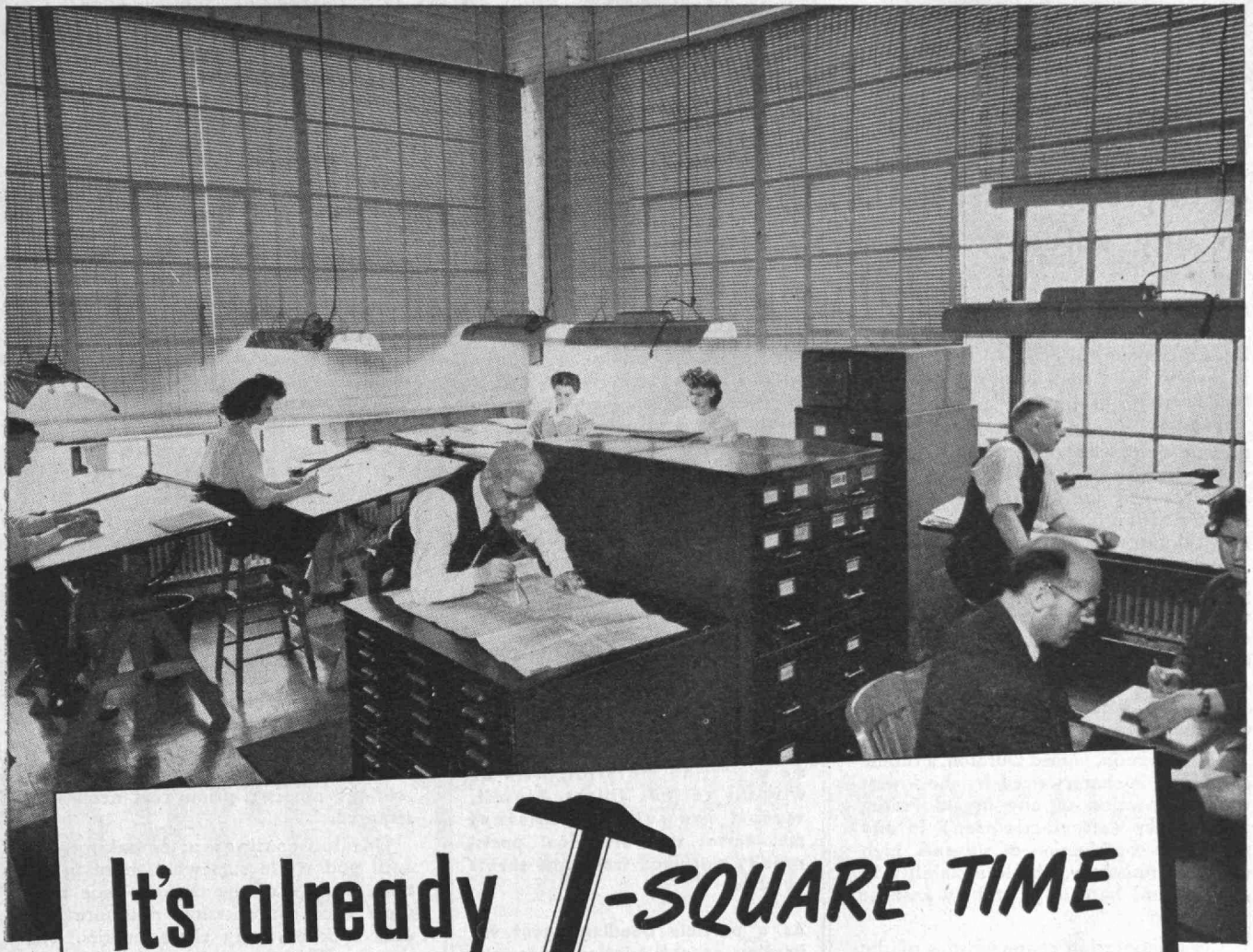
Not if we think straight . . . not if we plan ahead now.

If you are a manufacturer, there is one thing that you can do at once: Have your production men and planners consult now with the engineers of the basic machine tool producers. They can help you in planning ahead for the difficult task of reconverting your own skills and machinery to an all-out peacetime production.

One of these engineers is a Bryant man. We urge you to call him today. For his specialized knowledge of internal grinding machinery is important to the manufacture of literally *everything* that will make this country a finer place: this is victory, a victory that it will be safe for our boys to come home to.

BRYANT

BRYANT CHUCKING GRINDER COMPANY SPRINGFIELD VERMONT, U.S.A.



It's already T-SQUARE TIME

—Let FIDELITY Development Service help you get ready *now*

for Transition from war to peacetime production. At FIDELITY you get more than a notable designing and engineering staff. With it you get an unusual manufacturing organization and equipment, with testing facilities well beyond the ordinary.

This combination of talent and tools can speed up the practical development of automatic precision machines which may help you outstrip competitors.

You can supplement your own experience with FIDELITY'S war-bred techniques, its modern equipment and the technical imagination which, during the past third of a century, has contributed a long list of special-purpose machines that have multiplied manpower, cut horsepower and improved production and product.

If you need such a machine—particularly in the medium-size range—FIDELITY offers you an important service which can also include quantity manufacture and, in certain fields, marketing on a license basis.

You can get the FIDELITY story by writing for the 48-page book: "Facilities."

Intricate, Automatic Precision Machines

FIDELITY MACHINE COMPANY

3908-18 FRANKFORD AVENUE PHILADELPHIA 24, PA.

DURALON—*a new basic Resin*

Characterized by the lowest water absorption of any organic resin; complete insolubility in any solvent; high electrical resistivity

THE U. S. Stoneware Company announces the current availability for limited commercial and experimental use of a new basic resin having widespread immediate applications.

The new resin is being released at the present time with some reluctance. We would have preferred to have withheld announcement until thorough tests had established the full range of its chemical, physical and electrical characteristics.

But preliminary tests have indicated properties of such paramount importance to our war program that we feel impelled to make the resin immediately available for applications where it is presently suitable and for experimental usage in those applications where its indicative properties should prove of advantage.

The new resin, named Duralon, a furane derivative, is characterized by the lowest water absorption of any organic resin, insolubility (after activation) in any solvent or combination of solvents, high electrical resistivity, absolute stability in storage and handling, and by ease of workability.

The resinification characteristics of the furanes have been known for almost 100 years, but the difficulty of controlling their reaction in manufacture and their stability in storage has made impossible any substantial usage of their highly desirable basic properties.

U. S. Stoneware chemists, intrigued by the inherent possibilities of the material, have sought for some years an effective means of controlling reaction in manufacture and stability. For some time we have been incorporating Duralon resin into some of our Tygon materials to create certain desirable properties. As complete stabilization of the base resin was secured it became possible to make Duralon commercially available for general use.

Duralon resin, in its pure form, is a heavy, viscous liquid, dark maroon in color. On incorporation of catalysts and application of mild heat Duralon reverts to an extremely hard, dense, black substance. Varying physical, chemical and electrical properties can be developed in the base resin by incorporation of the usual fillers and lubricants. In certain stages Duralon can be readily machined by drilling, milling, turning, sanding, grinding, etc.

Duralon resins are readily soluble, before activation, in many inexpensive hydrocarbons, as well as in ketones and chlorinated solvents.

While preliminary studies indicate that Duralon possesses definite molding possibilities, its paramount immediate importance is as an impregnant, as a laminating and bonding agent, or as a protective coating material. It is in these applications that its resistance to moisture, its insolubility in solvents (even at elevated temperatures), its versatile surface characteristics (ranging from a high gloss to a crinkle finish), prove highly essential in solving many present-day problems. Many of these properties can be attributed to the unusual wettability of the unconverted resin.

Duralon solutions may be applied as coatings by any of the conventional processes, or may be used for impregnation of porous materials such as stone, cement, plywood, asbestos, glass fibres, or other fibrous materials, or as a bonding agent for abrasive compounds, powdered metals, etc., or for adhesive bonding of fibrous materials to each other.

INDICATED POSSIBLE USES FOR DURALON AND ITS SOLUTIONS

As a casting material, with or without various fillers, for oil, water, and solvent resistant mechanical and electrical parts, readily machined from cast sheets or rods.

As a particle bonding agent for friction or anti-friction materials, abrasives, powdered metals, etc.

As a protective coating for laboratory furniture, table tops, dry cleaning or vapor degreasing equipment, or for any equipment exposed to hot solvent fumes or excessive moisture.

As a protective coating for armature wiring, or any wire where unusual flexibility is not required.

As a surface bonding agent for wood, plywood, porous ceramics, glass fibre, cloth, paper or other fibrous materials.

As an impregnant for plywood, presswood, masonite, stone, asbestos-cement, glass fibre, paper, or other porous materials.

As a modifying agent for oil paints and varnishes to increase oil, water and solvent resistance, toughen films, improve adhesive and drying qualities.

As a wetting, plasticizing, or tackifying agent for synthetic rubber compounds.

As a modifying agent for other synthetic resins.

Prior to the application of heat, Duralon coatings are soft and flexible. As heat is applied (a mild bake is usually sufficient) the coatings remain thermoplastic up to a point, at which time they become increasingly thermosetting, depending upon the type and extent of activation. Other Duralon resins, shortly to be made available, are completely non-thermosetting and have interesting plasticizing, wetting and tackifying properties over wide temperature ranges.

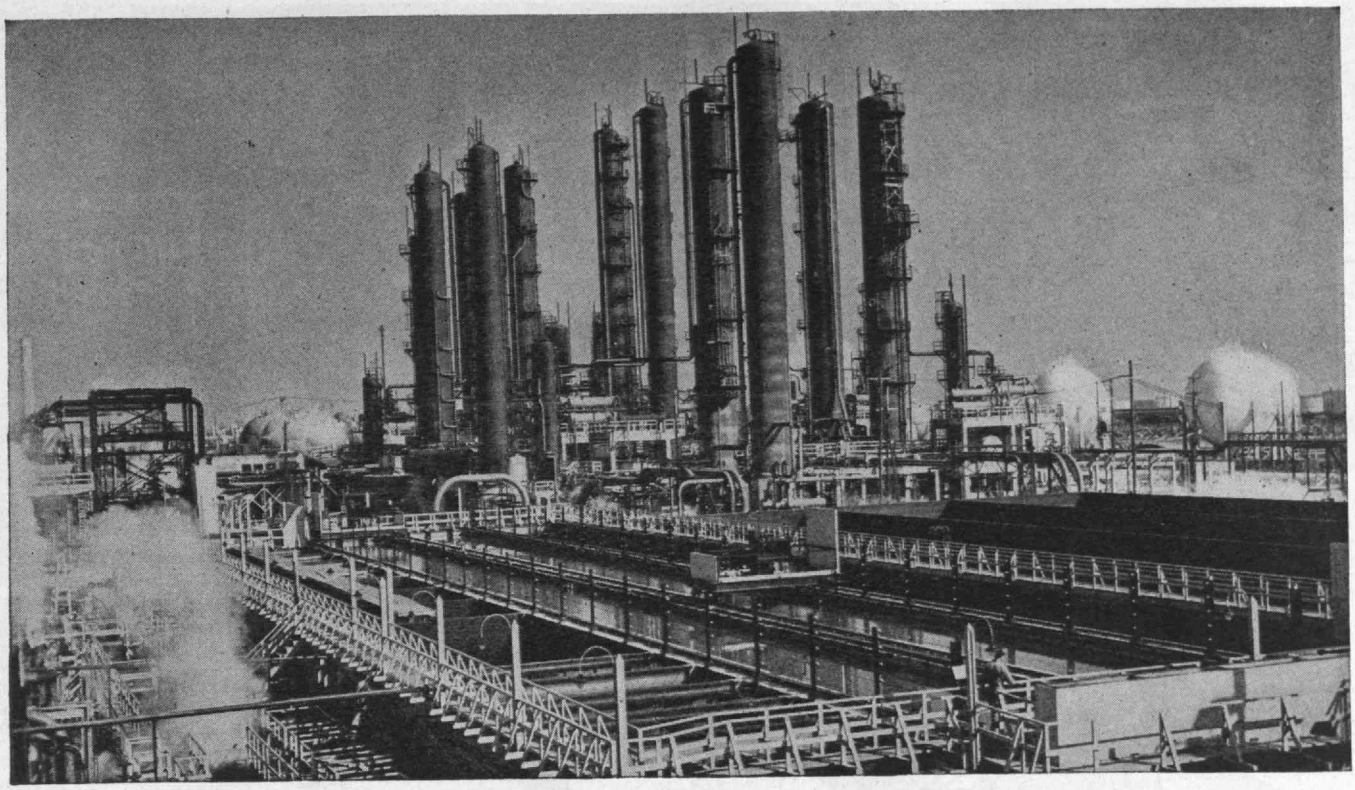
No particular surface preparation is needed before application of Duralon coatings, nor is a prime coat necessarily required.

Duralon coatings, after baking, are hard and while somewhat more brittle than coatings of the thermoplastic type, show excellent abrasion resistance and utter lack of aging characteristics. The water and solvent resistance of the pure Duralon resin is fully imparted to coatings made from the resin. Such coatings show practically zero water absorption, are unaffected by any solvent, possess excellent resistance to all non-oxidizing acids, and good resistance to alkaline materials. Products made from Duralon resins not only show a permanence of properties at normal temperatures but apparently retain a preponderance of their desirable properties at temperatures in excess of 400°F.

Duralon appears to possess tremendous potentialities as an insulating material in the electrical and communications industries, where low water absorption, high resistance to charring, freedom from cold flow, good dielectric properties and absence of tracking are desirable. In these respects Duralon gives promise of more closely approaching the properties of fused quartz than any of the present-day organics.

Duralon is available for immediate shipment either as a pure resin or in solution, in which form it is known as Tygon "F". Tygon "F" is made in solutions varying from very low to very high solids content.

U. S. Stoneware invites inquiries from firms with application possibilities for which Duralon appears to offer important advantages. In writing please inform us fully as to your proposed use. Address your inquiries to New Products Division, The U. S. Stoneware Company, Akron, Ohio.



LARGEST *SYNTHETIC RUBBER PLANT IN THE WORLD!*

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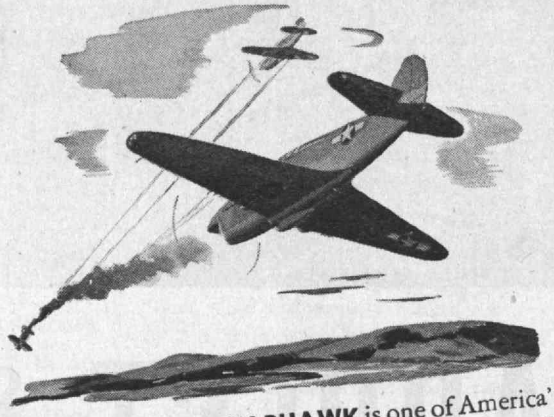

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VOLUME 46 NUMBER 8

THE TECHNOLOGY REVIEW

TITLE REGISTERED U. S. PATENT OFFICE

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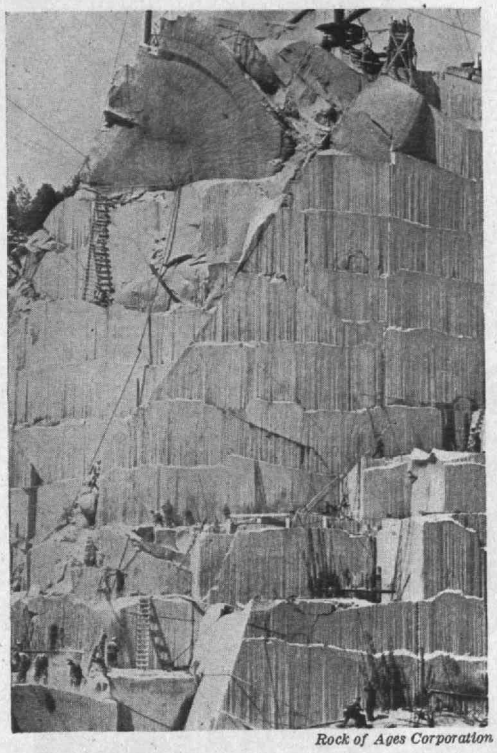
AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY



Rock of Ages Corporation

Configurations in a granite quarry in Vermont

CONTENTS for JUNE, 1944

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De Palma from Black Star

UP, OVER, AND DOWN

Ore loaders handling iron ore at Duluth

THE
TECHNOLOGY
REVIEW

Vol. 46, No. 8 June, 1944

The Trend of Affairs

Inside Rubber

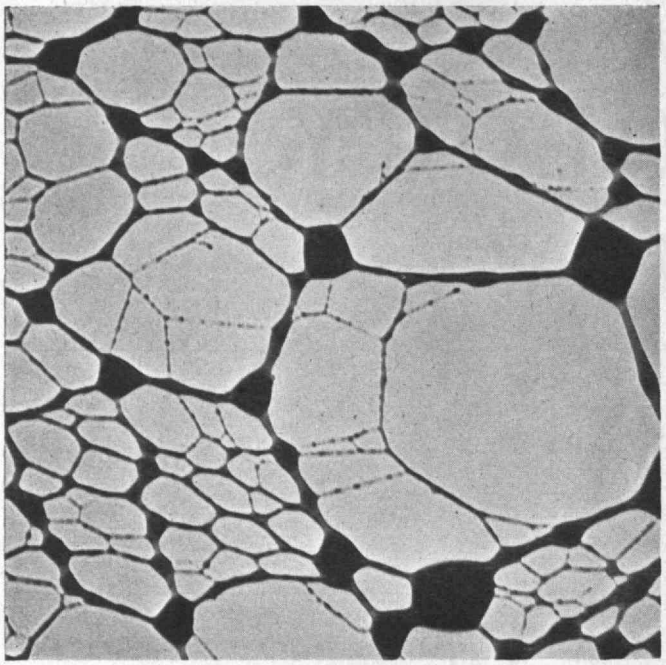
EXPLORING with the electron microscope the structure of natural rubber, researchers at the Institute have in recent months established visual proof of some of the theoretical assumptions earlier set up to explain rubber's property of elasticity. Since in these days the fate of nations in a very real sense depends upon rubber's ability to return quickly to its original shape after deformation, the findings are of particular interest. Interesting also is the fact that the techniques used in the study had been developed by Institute biologists for the investigation of protein fibers. The electron microscope research has been carried on under the direction of Francis O. Schmitt, Head of the Department of Biology and Biological Engineering, the participants including Ernst A. Hauser, Associate Professor of Chemical Engineering; Rée V. le Beau, research associate in Chemical Engineering; Cecil E. Hall, research associate in Biology; and Paul Talalay, assistant in Biology.

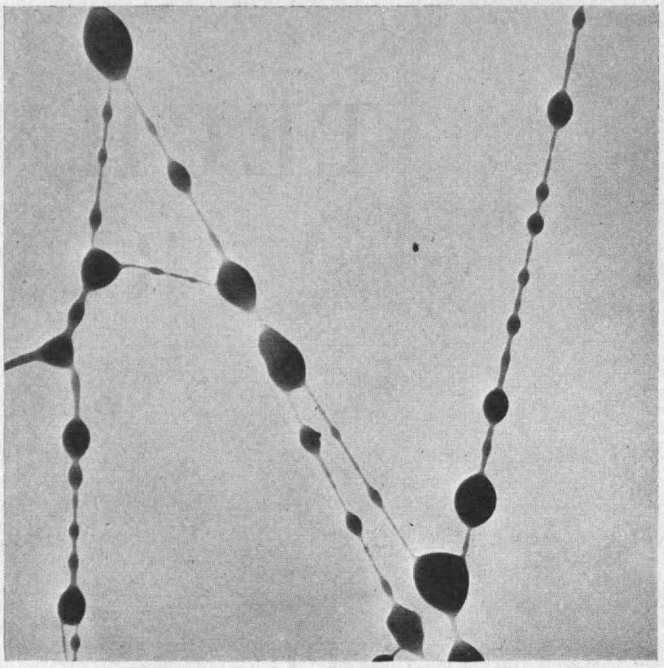
As reported by Mr. Hall in a paper at a recent meeting of the rubber division of the American Chemical Society, the research has disclosed fundamental structural differences between the two fractions into which natural rubber can be separated by suitable solvents, and which differ in their comparative viscosity and average molecular weight. The fraction of lower viscosity and lower average molecular weight is known as the "sol." The other fraction is called the "gel." Rubber in which the sol constituent is the greater is more plastic, or sirupy, than rubber consisting mostly of the gel, which is tougher and more elastic. The process of vulcanizing, basic to the manufacture of rubber into goods such as tires, is shown by these studies to be essentially one of converting much of the sol fraction of natural rubber into gel-like structures.

At the high magnifications obtainable with the electron microscope — as high as 100,000 diameters were used in this study — the M.I.T. research group found the long, flexible molecular chains composing rubber to be of two structures: The first consists of single threadlike filaments, along which are strung rounded nodules. Both thread and nodules of course are made up of aggregates of rubber molecules. In the nodules, the groups of molecules are bound by so little cross-linking of one chain to another that they may slip freely about and over each other, so freely in fact that the nodules may be referred to as "fluid."

The second kind of structure which the rubber molecules may form is a highly branched network of filaments, crisscrossed and cross-linked into a tight-meshed maze, with some fine beadlike knots of material strung along the meshed fibers. The molecules making up these beaded networks are packed far more closely than are those composing the nodules of the first type of structure, and they are cross-linked to each other. Consequently they cannot slip about one another freely, and consequently rubber in which this second structure predominates is far tougher and more resilient than is the softer rubber composed principally of the "soupy" nodular structure.

The sol fraction of natural rubber, the Institute group has found, consists mainly of nodular structures of the first type. The gel fraction has been found to consist entirely of the beaded networks of the second structural type. Thus the electron microscope contributes to explanation of why sol rubber is sirupy and plastic and why gel rubber is tougher and springy. The free-slipping unlinked molecular chains of the nodular sol structure can be easily displaced from a given starting arrangement and do not possess the linkages that would tend to pull them back to their original pattern. The close-packed, tightly linked chains of the beaded network, on the other hand, resist displacement and tend to return to their original arrangement if it has been disturbed. The vulcanized rubber band snaps back after it has been stretched, because it consists mostly of gel-like structures; for the same reason, the automobile tire composed of vulcanized natural rubber has strength to resist being torn as it bounces along a rutted road.





The electron photomicrographs on these pages were made at the Institute by a research group investigating the structure of natural rubber in an effort to determine how it contributes to rubber's valuable property of elasticity. At the left is shown, at 29,000x, the structure of natural rubber consisting of both sol and gel, the two fractions into which the substance can be separated by solvents. The sol, of lower viscosity and lower average molecular weight, is the bulkier and looser arrangement shown, composed of single threadlike filaments along which are strung rounded nodules. Underlying it in the photograph is the close-meshed gel structure, with beadlike knots of material strung along its fibers. At the right are shown natural rubber fibers made from the sol fraction alone. The magnification is 24,000x. Here the loose, "fluid" nodules characteristic of sol are obvious. . .

From the point of view of manufacture, these findings are significant. Before it is vulcanized for the production of tires or other goods, natural rubber is milled, or ground. Milling breaks down the gel portion of the original rubber, increasing the sol portion and bringing the whole nearer to a completely plastic state in which it can easily be molded to desired shapes. The vulcanizing process which follows has as its primary purpose that of driving the loose sol portion back to the tighter gel state by decreasing the proportion of sol and thus bringing the whole back nearer to an elastic condition. The electron microscope shows vulcanized rubber to consist almost wholly of gel-like structures.

The milling of carbon black into rubber in large quantities — 40 to 60 per cent by weight — is a standard means of increasing mechanical strength and toughness in tire treads. The Technology studies show in greater detail than before the position of the carbon black particles in the compound, and point toward conclusions about the preferable size and dispersion of the particles for the best results. Milling aids dispersion of the carbon black, for it increases the proportion of loose sol structures, into which the particles of carbon black find easier access than into the tighter beads. The milling in of the carbon black — in particles about a millionth of an inch in diameter — gives the loose chains of the nodules a chance to affix themselves to the carbon surface, the attachment of course at once lessening the freedom of movement of the chains.

Techniques involved in the studies are delicate and interesting. To get the fine fibers of rubber which he is to examine, the researcher dissolves a rubber sample in benzene and places a few drops of the solution on the surface of water, where it forms an extremely thin film. When the film is picked up on a fine metal screen, it ruptures, forming fibers which may be under varying tensions. For the study of vulcanized specimens, a special technique of vulcanizing had to be devised, since vulcanized rubber made by ordinary methods cannot be dissolved and therefore is difficult to study microscopically. Hence the Technology group worked out a way of utilizing an earlier process of vulcanizing rubber while in solution by exposing it to a mixture of hydrogen sulphide and sulphur dioxide gases which produces activated sulphur to bond the rubber.

With this background of knowledge concerning natural rubber, the studies are now being extended to synthetic rubber. It is hoped that showing the fundamental structural differences between the two may suggest ways of making the synthetics more nearly like the natural substance.

Synthesis

TWENTY of carbon, twenty-four of hydrogen, two of oxygen, two of nitrogen — thus runs the census of the atoms which compose a molecule of profound importance to man, the molecule of the drug quinine. The census was taken by the German chemist Strecker almost 90 years ago, and in the years since then one of the great goals of chemistry has been to succeed in marshaling these 48 atoms into the pattern characteristic of that molecule. Large in the news of the past month was announcement that the goal has been attained by two young chemists, Robert B. Woodward, '36, and William von E. Doering.

Their achievement, signalized as among the greatest chemical advances of the century, resulted from a program of research extending over 14 months. Announcement of its successful culmination was made by the Polaroid Corporation, to which Dr. Woodward, instructor in chemistry at Harvard, is chemical consultant. Dr. Doering, a doctoral candidate in chemistry at Harvard at the time of

the inception of the investigation, has subsequently joined the faculty of Columbia.

As data from history in undertaking the research, Drs. Woodward and Doering had Strecker's census of the atoms in the quinine molecule, made in 1855, and the pattern of arrangement of those atoms, which the German chemists, Rabe and Koenigs, had determined by 1908. In addition, they had as incentive the fact that the total synthesis of quinine — that is, construction of the quinine molecule by laboratory methods — had been a challenge and a defeat for their predecessors almost from the time of Strecker's analysis. The first recorded effort at synthesis, in fact, occurred in 1856. The Englishman William Perkin, then a youngster of 18, was prompted by a remark of his teacher, A. W. Hoffmann, to try to synthesize quinine from coal tar in the home laboratory where he spent his evenings in private investigations. In the course of his efforts, he oxidized impure aniline with chromic acid, but only a black, tarry mess (not quinine) resulted. From the black mess, however, Perkin obtained a bluish substance which turned out to be an excellent dye. It was mauve, or aniline purple, the first coal-tar dye ever prepared and the basis of a great industry.

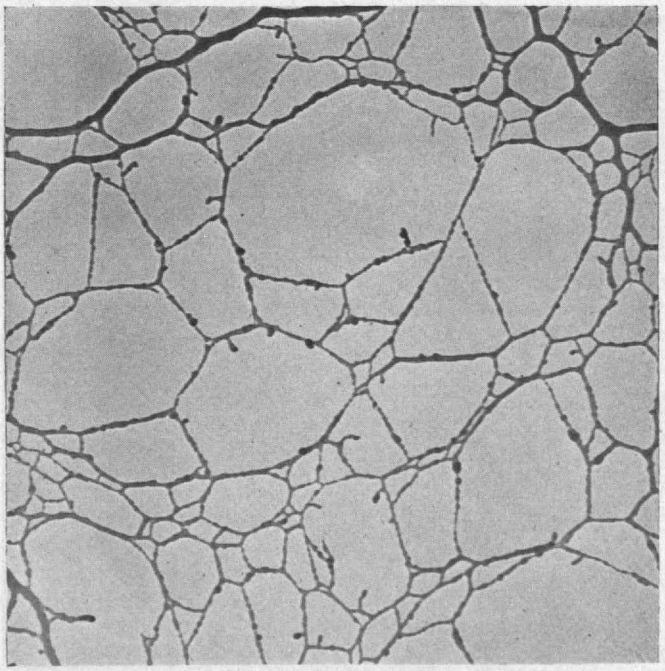
Even before this — before Strecker, in fact — the great Louis Pasteur had experimented with quinine, securing from it a related alkaloid known as quinotoxine, or quinicine. Pasteur's work was done in 1853. Long afterward — in 1918 — Rabe succeeded in synthesizing quinine from quinotoxine, but since doing so was actually merely reconstructing the quinine molecule from materials originally secured by breaking down the quinine molecule, the achievement was of little practical value.

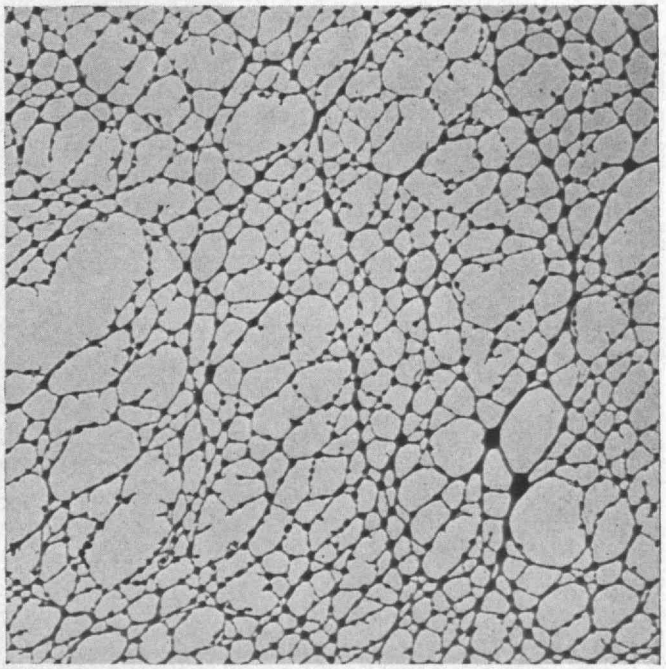
Here is where the Woodward-Doering process both echoes the past and strikes a resounding new note. The coal tar which Perkin worked with is the basic raw material of their accomplishment, and the quinotoxine which Pasteur and later Rabe manipulated is a principal means toward their victory. But their process produces quinotoxine from coal tar, not from quinine. Hence their further conversions result in the production of quinine from other than its usual parent materials and thus constitute a true total synthesis.

Starting with benzaldehyde, a simple substance available in unlimited quantities from coal tar, Drs. Woodward and Doering converted it into 7-hydroxy-isoquinoline, whence by some 15 subsequent conversions they brought about a gradual rearrangement of the various atomic groups within the molecule. Finally, they secured a substance with molecular structure resembling that of quinine. Delicate shifting of the nature of the atomic groups thereafter resulted in completion of the synthesis, the quinine thus produced being an exact and indistinguishable duplicate of the alkaloid obtained in nature from the bark of the cinchona tree.

The phenomenon of stereoisomerism which Frederic W. Nordsiek, '31, discussed in The Review for March plays an important part in the Woodward-Doering success. Their process involves the construction of the quinine molecule in the standard atomic arrangement described by Rabe and Koenigs, and in addition the construction of a molecule comprising the same number and kinds of atoms distributed in a spatial configuration which is a mirror image of the standard arrangement. This second molecule has no duplicate in nature. In the Woodward-Doering synthesis as performed at present, this optical isomer is separated from the quinine molecule. If later research should show the isomer to be of therapeutic power, the separation will be unnecessary.

Whether the rather intricate process evolved by Drs. Woodward and Doering for this synthesis can be made practicable commercially has not as yet been determined. The Polaroid Corporation does not expect to manufacture





. . . At the left here, magnified 23,000 times, is the beaded network of the gel fraction of natural rubber. In this type of structure the free-slipping, loose movement of the molecular chains which occurs in the "soupy" sol fraction is not possible. The cross-linking of the chains in the gel fraction causes them to tend to return to the original arrangement after disturbance. At the right, the effect of vulcanization is shown. The structure of this specimen of vulcanized rubber is magnified 25,000 times. Before vulcanization, this material produced fibers with many "fluid" nodules like those shown on the preceding page. The effect of vulcanization has been to link the long-chain molecules together so that the material now produces close-meshed networks similar to those from the gel fraction.

synthetic quinine; the process is to be licensed to organizations selected to provide the broadest use for it.

The achievement of the two youthful chemists — both Dr. Woodward and Dr. Doering are 27 years old — is of great significance not only because it masters a chemical problem of long history but also because it may be expected to pave the way toward final mastery of one of mankind's greatest scourges — malaria. Quinine is the most useful drug for the combating of this disease, which affects more human beings than does any other communicable disease and which exceeds all others in its geographical distribution. For three centuries, Western civilization has relied upon the quinine which South American Indians were using in the bark of the *yarachucchu* when the conquistadors first reached their continent. Japanese occupation of Java in 1942 cut the civilized world off from the principal source of the natural product, and so spurred ingenuity in the mass production of atabrine and plasmochin, synthetic antimalarials which Rudolf E. Gruber, '16, discussed in The Review for February, 1943. With armies embattled throughout the world, means of controlling Plasmodium — the protozoan parasite which anopheline mosquitoes transmit to man and which produces fevers by penetrating and destroying man's red blood cells — are of imperative importance. In so far as the Woodward-Doering synthesis may either ultimately counteract short supply of quinine or possibly lead to an improvement upon quinine, it is hence of the first significance in humane terms. Consider merely the fact that in India every year Plasmodium kills more than 1,500,000 people.

The Polaroid Corporation's announcement of the success of Dr. Woodward and Dr. Doering possesses extra interest. The patent taken out in 1933 by Edwin H. Land, now President of the company, and Joseph S. Friedman, on polarizing mediums was for a process of fixing in transparent film "a plurality of granular crystalline bodies having their polarizing axes oriented to be in substantial parallelism." The "granular crystalline bodies" thus used were minute crystals of sulphate of iodoquinine, more familiarly known as herapathite, in honor of the British physician who first discerned the remarkable polarizing property of the crystals that form when iodine and quinine salt are combined.

Rockets

ALTERNATION between the idea of a weapon of war and the idea of a fireworks display has been the history of rockets over the past five centuries, Willy Ley observes in introducing a volume * concerned chiefly with a third idea. Though the cyclic swing of events has now centered attention once again on the rocket as a weapon, it is his contention that the rocket as a means of travel beyond the stratosphere — this phrase constituting the subtitle of the book — is even now far more important despite the fact that it remains unproved.

Disavowing any role of a man who wants "to fly to the moon" or even "to shoot to the moon," Mr. Ley spends respectable space in clearing for the uninitiated reader the jungles of miscomprehension obscuring the fact that rockets don't fly and aren't shot. His explanation of rocket propulsion in terms of Newton's Third Law, stated early in the book and returned to whenever occasion warrants, is thoroughgoing and should be (*Continued on page 516*)

* *Rockets: The Future of Travel Beyond the Stratosphere* (New York, Viking Press, 1944), xi + 287 pages, $3.50.

Springtime in England as it graces the village of Herrington, Kent

Multiplier of Resources

The Past Quarter Century of Petroleum History Demonstrates the Power of Technology to Make More from Less

By Robert E. Wilson

QUESTIONS which have been raised in recent months as to the adequacy of our national oil reserves are naturally attracting much attention from the oil industry, from the public, and from governmental authorities. Many things do need to be done, and done promptly, to aid the industry in meeting the peak demands of wartime. Before we become pessimistic as to the postwar outlook, however, we should take a broad view of both our natural and our technological resources, each vital to the future of our country. The most convincing demonstration of the petroleum industry's faith in the future of petroleum is the fact that since the outbreak of war the industry has invested about $525,000,000 of its own money in new refinery equipment to meet war needs. Thoughtful men, however, will want to know some of the logic and reasoning behind that demonstration of faith, and that is the purpose of the following discussion.

That this is by no means the first time that the country has been concerned about the future of its crude reserves is plain if we go back only 25 years to the end of the first World War. At that time the industry was at the close of a period which had strained its resources. With the stimulus of war demands for crude and for products, and with prices at the refinery about double those prevailing today, the industry had sharply increased its production, expanded its refining capacity, and stepped up its search for new fields. Solid trainloads of gasoline had moved regularly from Wyoming to the Gulf Coast for shipment to Europe, and a little later others moved from El Paso to California. The shortage of tankers was acute.

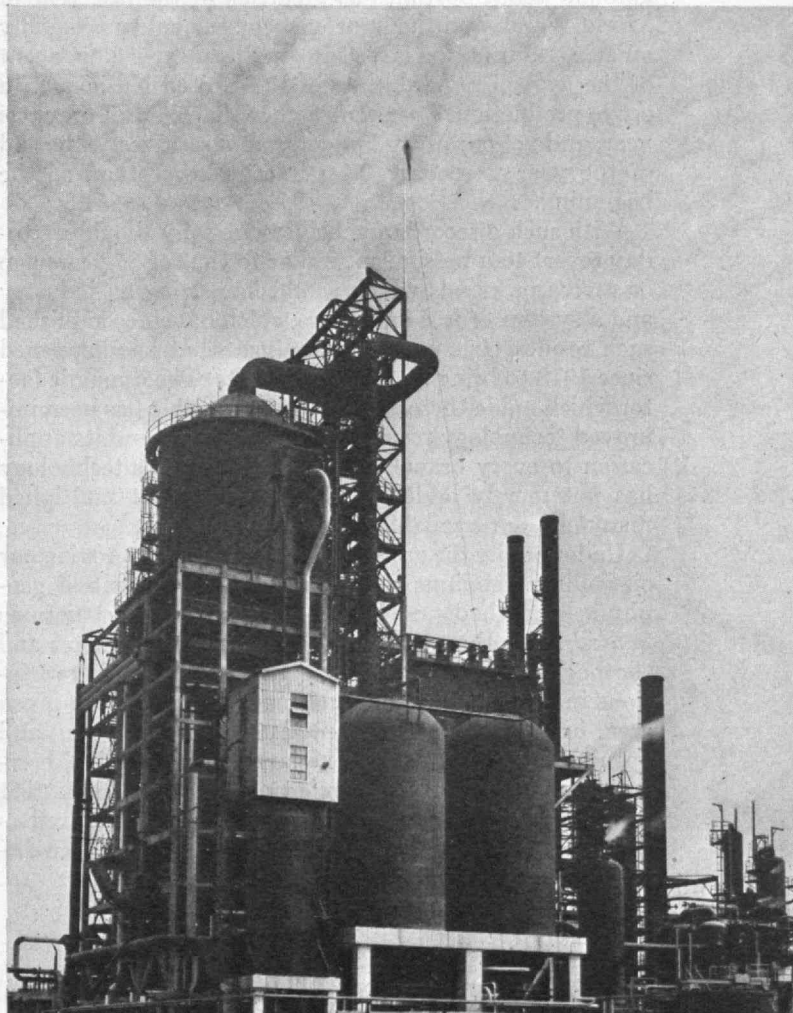
There was increasing concern then as now as to the adequacy of our oil reserves. In those days geologists did not follow the present practice of limiting their estimates to proved reserves but were ambitious enough to endeavor to predict the total recoverable reserves underlying the whole country. In 1918 the current estimate of the total remaining recoverable reserves, made by the United States Geological Survey and concurred in by most other authorities, was under 7,000,000,000 barrels, of which probably less than half constituted proved reserves in the modern sense. New discoveries at that time were small, and surface geology appeared to be approaching exhaustion as a method of finding new fields. Only by the importation of over 10 per cent of its crude supplies, mainly from Mexico, was the industry able to meet the heavy demands of the last year of World War I. The common prediction was that crude production from the United States would reach a maximum in 1920 or 1921 at a figure around 400,000,000 barrels a year and then gradually decline.

About that same time, a professor of chemical engineering in one of our leading universities published a book in which he predicted that within 10 years oil shale would become our main reliance for oil. Several major companies bought up large oil shale reserves. Walter C. Teagle, President of the Standard Oil Company of New Jersey, stated in 1920 that "domestic crude is not sufficient even for current home needs, and it is absolutely imperative that American petroleum producers proceed actively and intelligently to develop oil resources in foreign lands."

During these times customers were increasingly concerned about the future quality and quantity of various products. While the average yield of gasoline from crude had been increased from around 18 per cent to around 25 per cent, partly through the Burton thermal cracking process and partly through raising the end point of gasoline, the Burton process was approaching its apparent limit and the raised end point of gasoline was the cause of widespread complaint by automotive engineers and users because of hard starting, crankcase oil dilution, and excessive knocking, even in the low-compression cars of that day. Charles F. Kettering of General Motors told the

Towering 20 stories into the sky at Texas City, this is a catalyst cracking unit, one of the group of facilities at the dedication of which, in March, Dr. Wilson delivered an address from which the accompanying article is drawn. This unit is the heart of a system supplying components for 100-octane aviation gasoline.

Pan American Petroleum and Transport Company



American Petroleum Institute in 1920 that "the only cloud on the internal combustion engine horizon today is the fuel supply, and there can be no doubt that the business public is apprehensive on that point." Economists advised against making investments which would be dependent upon the continuation of gasoline as cheap as 25 cents a gallon — and that was before the day of gasoline taxes! The elder La Follette was soon to make his published forecast of $1.00 a gallon for gasoline. Others feared that the increasing diversion of kerosene into gasoline would force the farmers back to whale oil as their principal source of light. Still others predicted serious shortages of lubricating oil, as it was not then known how to make good lubricants from shale oil. No one even guessed that processes would soon be developed for converting either coal or natural gas into gasoline. There was considerable agitation for the nationalization of the oil industry and for sharp limitation of consumption.

With this drab outlook, so reminiscent of many recent gloomy statements, let us see what has happened to that total recoverable reserve which was estimated to be less than 7,000,000,000 barrels. Since 1918, cumulative production has totaled 23,500,000,000 barrels. And yet, at the end of this 25-year period, we possessed really proved reserves in excess of 20,000,000,000 barrels of crude oil. During the same period, our proved reserves of natural gas increased approximately sevenfold. In 1943 this country produced more than four times as much crude oil, more than seven times as much gasoline, thirteen times as much natural gasoline, and five times as much natural gas as in 1918.

Lord Curzon and others gave the petroleum industry a large share of credit for winning the first World War. Our daily output of gasoline for military use in this war is running about 18 times as great, and that of aviation gasoline about 80 times as great, as in the last year of World War I, and the improvement in quality is equally amazing. Our nation last year supplied nearly 80 per cent of the war oil requirements of the United Nations, with crude production 7 per cent higher than in any previous year, and yet our proved underground reserves at the end of the year were only 0.1 per cent lower than at the beginning.

With such a record of achievement, why should we today revert to a pessimism similar to that of 25 years ago or revive proposals which would hamstring an industry and a system of free enterprise which have accomplished such results? Let us rather analyze what has happened since 1918 to bring about these results. The dynamic factor which made these achievements possible has been improved technology resulting from research, and its application to every branch of the industry. This technology has not merely added to, but has in effect multiplied manyfold, our available petroleum resources.

Undoubtedly the greatest single factor in improving our oil-finding technique has been the development of geophysical methods of locating underground structures favorable for the trapping of oil. The gravity meter and the magnetometer, which respectively measure tiny variations in the gravitational and magnetic fields in a given area, have played a substantial part in the finding and opening up of new fields. The largest contribution, however, has been made by seismic methods which, by setting up earth waves and measuring their refraction or reflection, have accounted for nearfy three-quarters of the discoveries of new oil fields during the last decade, on most of which there were no surface indications of favorable structure. This was a tool not even dreamed of by the industry in 1918, though it is interesting that the technique came partly as outgrowth of some scientific work on range finding to locate large guns, carried out during World War I.

Electrical logging has been another outstanding development of recent years. Devices for electrical logging, by measuring certain electrical properties of each stratum in newly drilled wells, make possible accurate determination of the position and probable content of even thin sands. This tool minimizes faulty completions, permits far better correlation between wells to determine the nature and trends of the structure, and saves much time-consuming coring, a factor which is especially important in drilling the very deep wells characteristic of today.

This deep drilling has been another important technical development, made possible by a wide variety of improvements in steel, in drilling-bit designs, in mud circulation, and in rotary drilling. In 1918 the deepest well, considered to be about the practical limit, was 7,579 feet. Today the deepest well is just about twice this depth, and most of the important discoveries of the last few years have been made at depths below the 1918 limit of the drill.

Certainly no more need be said to demonstrate the fact that improved technique has served as a tremendous multiplier in the discovery and development of new oil reserves. Of probably equal importance, however, has been the development of improved producing technique, and especially the practical elimination of "wide-open" methods of production. Typical fields operating according to production methods of 1918 normally recovered less than one-third of the oil in the sand. Today the industry and the state control authorities recognize the prime importance of limiting the flow of an oil field throughout its life to a figure which will avoid premature intrusion of water or dissipation of gaseous energy and will thus insure maximum ultimate recovery of the oil in the sand. Sometimes this involves an artificial water or gas drive to flush out the oil as completely as possible. Such procedures result in typical ultimate recoveries of around 75 per cent of the oil in the sand, again multiplying our recoverable oil resources. Similar methods are employed for the "secondary recovery" of large quantities of oil left in older depleted fields, though using such methods is more costly and less effective than following proper production practices from the time a field is first discovered.

Considerable question has been raised with regard to the propriety of repeatedly revising upward the estimates of proved reserves in old fields; such additions are sometimes discounted as mere "pencil discoveries." Many of these additions, however, reflect the discovery of new horizons or extensions of old fields, and others reflect the result of better producing methods or secondary recovery methods. Such figures therefore represent very real additions to the proved reserves on which we can definitely rely.

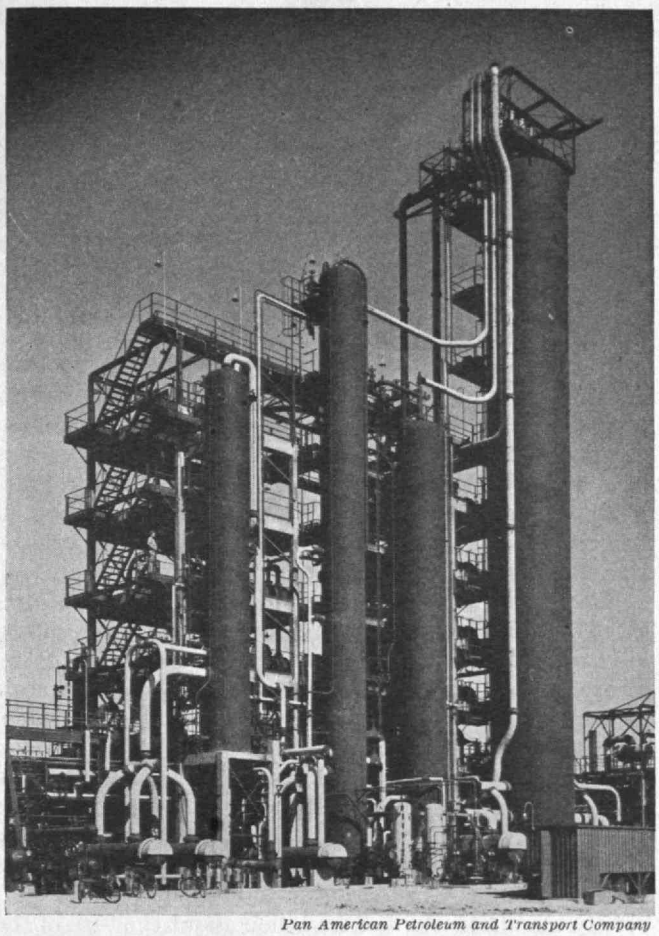
I think it may safely be concluded that if we had had to continue to rely on the 1918 techniques for discovery of oil and on the 1918 general practice in drilling and production, either our petroleum industry would be moribund or we should have been forced long ago to high-cost substitutes. In either eventuality, the oil, automobile, and rubber industries could not have enjoyed the tremendous

growth which they have, and ours would not be "a nation on wheels."

Equally important from the standpoint of getting the most out of our natural resources have been the amazing developments in refinery technology since 1918. An important forerunner, visible in 1918, was the Burton thermal cracking process, which contributed substantially to the unprecedented yield of 25.3 per cent of gasoline from crude in World War I. More important than this was the fact that the development of the cracking process first awakened the refining branch of the industry to the realization that it was fundamentally a chemical industry and that its future did not consist in merely taking just what came out of the ground and separating it for the markets. Large cracking royalties, whether received or paid, constituted the greatest stimulus to research any industry has ever known. In 1918 fewer than 200 technical men were engaged in research in the petroleum industry. Compare this with today's figure of 8,000 to 10,000 and you see both the principal cause, and one of the effects, of the contributions of technology to this industry during the last quarter century.

Tremendous improvements in the art of cracking, beyond anything which could have been dreamed of in 1918, steadily increased the yield of gasoline from crude to around 45 per cent in 1941. The outstanding development of recent years is, of course, catalytic cracking, the giant towers for which dominate the landscape in most of our refining areas. The new art of catalytic cracking will probably exert as large an influence on the quantity and quality of future gasoline as did the original Burton thermal cracking process. If the catalytic units already built or building in the United States are to be used in such a way as to give a maximum yield of high-quality automobile gasoline without the shutting down of other cracking units, the average yield of gasoline from crude will be increased to about 57 per cent. As a matter of fact, the only remaining limitation to the yield of gasoline obtainable from a barrel of crude, by processes already fully developed, is the public demand for other products whose economic value is close to that of gasoline — namely, kerosene, lubricants, and household fuels. Even without any change in individual product prices, this possibility should put a higher postwar value on every barrel of crude in the United States because it will no longer be necessary to produce a large by-product of heavy fuel which would have to compete with coal. However, those uses of heavy fuel which can stand a moderate premium above the cost of coal will undoubtedly continue to be supplied, either by the older types of refineries or by the importations of heavy foreign crudes or fuel.

Cracking is, however, only one of many new processes which have made important contributions to the yield and quality of modern motor fuel. Polymerization processes now are responsible for the daily output of many thousands of barrels of high-quality gasoline from refinery gases which in the past were wasted or burned as fuel. By modification, these processes have contributed largely to the production of 100-octane gasoline. Alkylation — involving the reaction between isobutane and various olefins — is a brand-new development of the past few years which converts other gaseous constituents into high-quality gasoline. While simple on paper, this reaction was not even considered possible a bare dozen years ago, yet it is today the backbone of our tremendous production of



Pan American Petroleum and Transport Company

The main tower group of an alkylation unit, where sulphuric acid is the catalyst. Its product, alkylate, which can be used to make gasoline of better than 100 octane, is blended with other lower octane materials in the production of 100-octane airplane fuel.

100-octane gasoline. Hydroforming, hydrogenation, isomerization, and many other long-haired additions to the family of chemical processes used by our refineries have come out of our research laboratories to make major contributions to the air superiority which is so largely responsible for our present situation in the war. Tetraethyl lead is another outstanding development of the past quarter century making for better antiknock gasoline.

Largely, though not entirely, because of improvements in the quality of gasoline and lubricating oil, the modern aviation engine is about ten times as powerful, weighs about a quarter as much per horsepower, and has about 40 per cent greater thermal efficiency as compared with those of the first World War. These factors have increased the load-carrying ability, range, and performance of military planes far beyond anything dreamed of even a dozen years ago. Similar improvements in motor gasoline have made possible increasing the average compression ratio of automobile engines by over 50 per cent — though most of this gain has been taken in the form of better performance rather than greater average mileage on the road. Technology has also been the principal factor in the general downward trend in costs and prices since 1918.

Thus, despite the outstanding accomplishments of the new oil-finding and producing techniques, had it not been for the developments in refining technique we should today have barely half enough crude oil to meet our gasoline demands and the quality would be such that modern automobiles, let alone modern (*Continued on page 498*)

Forty Years of Electronics

Bullet or Wave, the Electron Is Usefully Controlled by the Most Amazing Engineering Art

By John Mills

THE electron was introduced to the reading public of America in September, 1901, by J. J. Thomson. Writing for *Harper's*, the Cavendish professor of experimental physics at Cambridge, England, recounted the evidence which had led to the conclusion that there is in all matter a subatomic particle with electrical characteristics. And now, 40 years later, the engineering art of "electronics" is being advertised as doing much to win the war and as promising much more after peace comes.

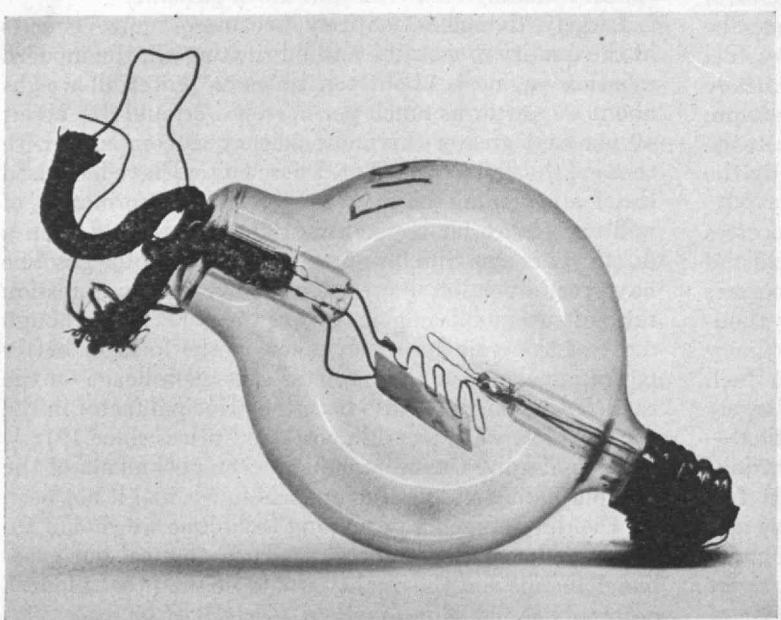
Except as it may imply that the art is the special preserve of individual advertisers, this advertising is unusually truthful, because electronic devices are vital in every form and theater of warfare and their postwar accomplishments will excel in economic importance and social value. (Because of military secrecy little should be said today about applications to war. Those of the peace to follow will in many cases be adaptations of present wartime uses.)

The advertising is misleading, however, if it implies that electronics is primarily an industrial product. University scientists laid its foundation about the turn of the present century. They disclosed the electron — the tiny negative particle, — recognized it as the agent for the conduction of heat and electricity in metals, proved its part in the structure of atoms, and discovered the several ways in which it can be freed from atoms and so made available to perform the electronic marvels of today. Theirs was a contribution of pure science, however, and they did little toward developing the engineering applications. One exception was the x-ray, but that was a discovery, not an invention; and, moreover, the perfected structure of the x-ray tube came years later from an industrial research of William D. Coolidge, '96, in the General Electric Company.

On its engineering side electronics started with inventions, specifically in the United States with the invention by Lee deForest in 1906 of a device called the "audion," which he intended to be an improved detector of radio signals. It was a little tube about the size of those in your radio set, and the progenitor of all of them. It was an excellent detector, but it proved to be much more — to be, I am convinced, the most important invention of the first third of this century. An invention, pure and simple, it had little relationship to all the preceding academic research; and although it was a mechanism for the delicate control of streams of electrons, explanation of it in terms of electrons followed invention of it by several years. Like the x-ray tube, it awaited the co-ordinated attack of industrial research.

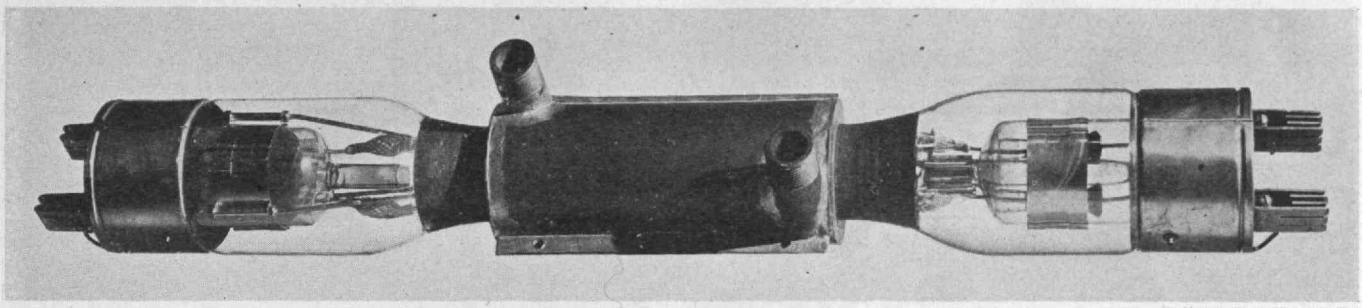
One reason why the audion remained in obscurity for several years was that to many it was just another wireless detector — another gadget in the young and economically unimportant art of radiotelegraphy; its wider potentialities were largely unsuspected. Another and more important reason was the rather general disregard with which the scientific and engineering community, except for some physicists, dismissed electrons as a pure-science concept of little practical concern. In colleges knowledge of the electron was usually reserved for graduate students. In courses on electrical engineering it was scarcely mentioned. And it was completely disregarded by chemists although it is the key to the combination of atoms into molecules. The wireless engineers and the wire engineers also were too immediately practical to sense its future. But before long this neglect was replaced by a genuine interest on the part of two important industrial laboratories: First was the General Electric Company, whose recently formed research laboratories were motivated by an interest in x-rays. In an x-ray tube, as we now know, electrons streaming through highly evacuated space strike against a metal target. Their blows derange the innermost electrons of atoms, and the electrons, as they return to their normal disposition, release tiny bullets of energy (photons) far more penetrating than those of visible or ultraviolet light.

The other organization interested in electrons was the research group that Frank B. Jewett, '03, was assembling in the Western Electric Company for a more scientific attack on some problems of telephony. What the telephone system needed was an amplifier which could be con-



Bell Telephone Laboratories

The audion of Lee deForest — 1908 model — engineering beginning of electronics



Bell Telephone Laboratories

This high-power vacuum tube, based on structures developed by DeForest, was used in 1928 in radiotelephone transmitters which permitted commercial telephone service between the United States and England and Europe. This tube had a rated output of 10 kilowatts, in contrast to the less than a watt supplied by the original audion — so far had electronics advanced in its first 20 years.

nected into a long-distance line to receive speech currents and to send on along the line similar but amplified currents. With such a device, distance would no longer be a limiting factor; also, smaller and therefore less expensive wires could be used and long-distance rates reduced. There existed an apparatus that worked something like a receiver held against the mouthpiece of a transmitter, but it had limited possibilities. Better results could be obtained if the vibrating system had less inertia, as would a stream of gaseous atoms or electrons.

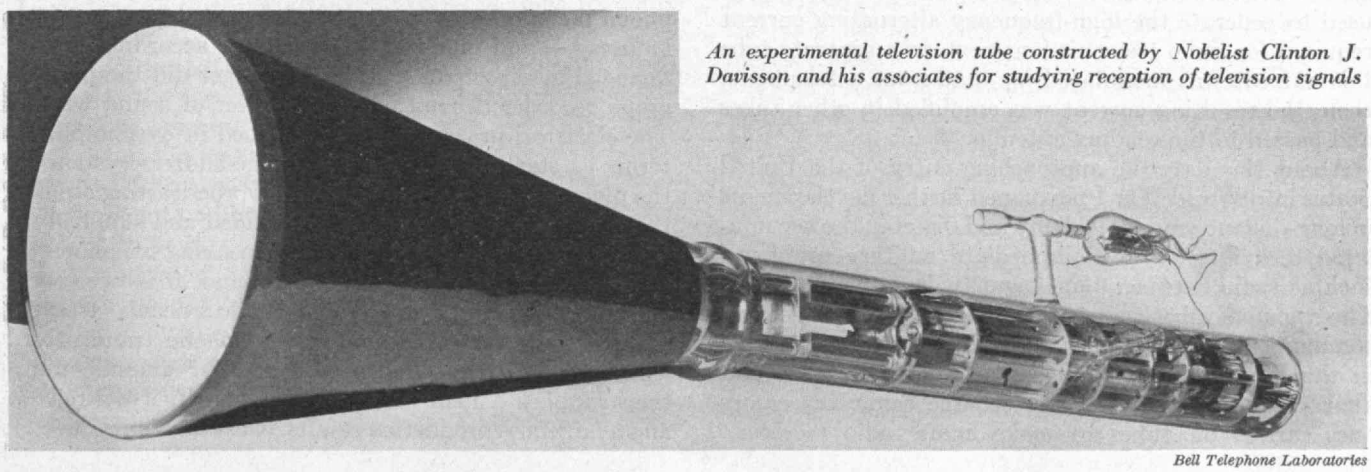
About that time the telephone company was offered rights under the DeForest patents on the assumption that the audion could serve as an amplifying element. Previously the audion had acted as a detector for receiving radio signals. Like other detectors, it had responded to intuitive twiddling of its controls and prayerful or profane manipulation by its operator. It was not a device which, once placed in a circuit, would work reliably and at its best the moment the control switch was thrown. The audion needed development to release its manifold potentialities; and that it got from the telephone researchers.

DeForest's audion was a small glass bulb from which a pump had removed all the air it could. Within, attached to lead-in wires, were three electrodes — terminals through which electricity can enter or leave. One electrode, a filament, was heated red hot by a battery. The second was a metal plate. If another battery was connected, positive terminal to plate and negative to filament, a current flowed through the tube. (The heated filament "boiled out" electrons, and they streamed to the positively charged plate.) The third electrode, the epoch-making addition of DeForest, was a wide-meshed grid between plate and filament but much nearer the latter. In its strategic position it could delicately control the current, urging electrons to come through its meshes or driving them back toward the filament. Acting at the grid, therefore, a feeble electrical cause could produce an amplified effect on the current. So it was reasonable to assume that the audion could amplify a telephone current; but telephone currents, although very small as compared to those of the power industry, were more than the tube could handle reliably.

The reason was recognized by H. D. Arnold, who had recently studied electrons under Professor Robert A. Millikan. Arnold had never seen an audion, but his background in physics was such that the moment he saw it trying to be a telephone amplifier he knew the reason why it wasn't fully effective. His work was no more a reflection on DeForest than was Coolidge's on Roentgen, the discoverer of x-rays. The operation of either tube could be amazingly improved if the tube could be more highly evacuated so that the electron stream was less impeded by molecules of air. Otherwise some molecules get hit and have electrons knocked from their atoms. The damaged molecule, no longer possessed of its normal amount of negative electricity, is positively charged. It therefore sets forth in a direction opposite from that of the electron stream; and its newly freed electron joins the electronic procession to engage, like its fellows, in damaging collisions. These collisions result in more electrons to make a still larger stream — a larger current of electricity. And so the current grows by leaps and bounds.

That, incidentally, is the process also in the lightning discharge. A few free electrons, wandering among the electrically neutral molecules of the atmosphere, are urged so violently between charged cloud and oppositely charged earth that they accelerate to atom-damaging speeds and quickly produce the myriad of electrons whose motion constitutes the fierce current of a lightning stroke. (The free electrons which start all the ruckus prob-

An experimental television tube constructed by Nobelist Clinton J. Davisson and his associates for studying reception of television signals



Bell Telephone Laboratories

Bell Telephone Laboratories

Back in the days of "canned" music — a phonograph recording studio prior to the introduction of electronic and telephonic methods for recording sound. The abnormal grouping of the orchestra and the use of "stroh" violins with resonant horns are hallmarks of mechanical recording.

ably are driven from their atomic homes in air molecules by impacts of cosmic rays or by radiations from radioactive substances in the earth's crust.)

A current like that of lightning — smaller, of course, but also uncontrollable — flowed through the audion when it tried to handle telephone currents. By improving the vacuum, Arnold obviated collisions between electrons and gas molecules and insured that the current should be due solely to the electrons liberated at the filament. The audion thus forsook its sometime paths of gaseous discharge and became for all time a purely electronic device. After other improvements, its unique structure was soon adapted to wire telephony. And early in 1915 it began to play its part in transcontinental telephony.

Once the audion could amplify telephone currents, it was started on its eventful career. Late in 1915, for example, when more powerful tubes had been developed and certain techniques invented, the audion as a vacuum tube returned to what was then called "wireless telephony." Up to that time telephoning by radio waves had been possible only over relatively short distances. The telephone men set themselves the goal of transatlantic radiotelephony and demonstrated its possibility on several occasions by transmitting a few words from a Navy antenna near Washington. These words were heard by listeners stationed in Paris and Honolulu. In that experiment the vacuum tube performed not only at the receiving station to detect signals but also at the transmitting station to produce the antenna current. First, the tube was used to generate the high-frequency alternating current required for radio transmission; next, in a separate tube this current was modulated by that from a telephone; then, the resulting current was amplified in other tubes and passed to the sending antenna.

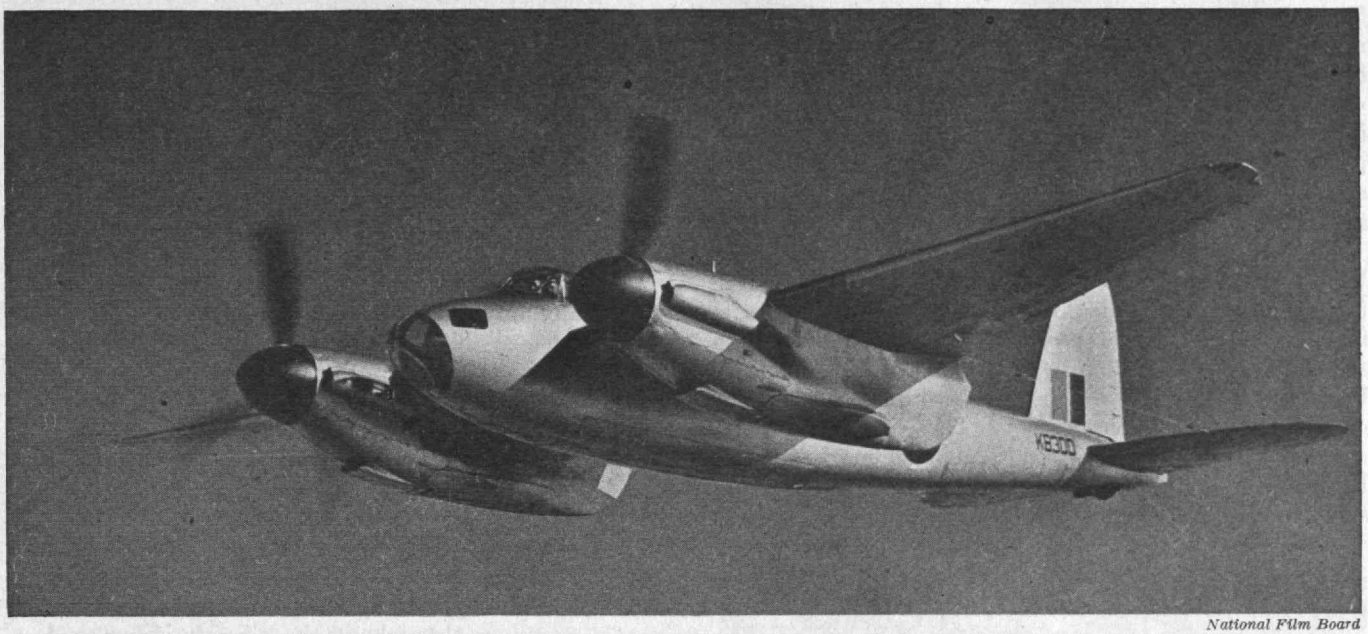
About this date the approaching entry of the United States into World War I postponed further developments in long-distance radiotelephony and directed the accumulated techniques toward immediate military problems, such as radio between planes and their ground stations. The vacuum tube went to war and served in electrical communication, both wire and radio. Thousands of men in the Signal Corps learned about vacuum tubes and about radiotelephony; when discharge came, the canny ones carried off tubes to make home radio receivers.

Then began the boom in radio. Commercial broadcasting was started by the Detroit *News* station and by the Westinghouse company from its Station KDKA in Pittsburgh. The Radio Corporation of America was formed, under some tutelage by General Electric, from the old Marconi Wireless Telegraph Company of America. Scores of companies sprang up to make radio equipment, for there certainly was gold in them there electrons. But not so much as later, when the vacuum tube reached the motion-picture industry. And it got there with a hop, skip, and jump.

The hop took it to the public-address system — the aid ever since of weak-voiced speakers or of large audiences. This system is a combination of telephone transmitter — generally known as "mike," from microphone — vacuum-tube amplifier, and loud-speaker.

The next move carried the vacuum tube to phonograph recording. In those days records were cut by a graver driven by a diaphragm at one end of a horn which gathered up the voices of the performers. The vibrating graver traced a sinuous groove on a soft wax disk which revolved beneath it. The groove was then transferred to a hard plate which served as a master to stamp out replicas. By this process the sound was canned and it sounded that way. Faint sounds, those of lowest pitch, and almost all the upper harmonics were not recorded, because they had too little power or were beyond the limited responsiveness of a diaphragm whose vibrations were hampered by wax.

So the vacuum tube skipped in with its associated telephone techniques to make the phonograph an electrical industry — and much to its advantage according to the financial gossip of those days. No longer did the phonograph recorder depend upon the power of sound waves. The electrical process can be described in oversimplified terms as starting with a good public-address system or the pickup and speech amplifier of a broadcasting studio, the current output of which is amplified and supplied to the electrical mechanism of a loud-speaking telephone to drive the graver. To recreate the sound, it is necessary only to let the groove in a record wiggle a needle fastened to the diaphragm of a modified telephone transmitter. The current from the transmitter, after amplification, then supplies a loud-speaker — or several, if desired — and a faithful reproduction results. (*Continued on page 504*)



National Film Board

Mosquito Engineering

Wood, Craftsmanship, and Ingenuity a Powerful Combination in the Speedy British Warplane

By Albert G. H. Dietz

THE speedy Mosquito, Britain's fast light warplane, represents a high point in engineering applied to wood, plastics, fabric, and metal combined to produce ships of outstanding qualities. Although Germany claims now to have aircraft faster than the Mosquito, it is certain that for a relatively long period at least, the Mosquito bomber was faster than any other ship, either fighter or bomber, and it is still among the fastest of all if, in fact, it actually has yielded first place. At the same time its range is such that it has flown from Britain to Russia in time for lunch, and back again the same afternoon.

Speed was also the order of the day in the initial design and production of the Mosquito. Within a month of the outbreak of war, DeHavilland's engineering team set to work. Twenty-two months later the airplane was in production. As a matter of fact, one of the reasons for choosing wood for the structure was the ability to get the craft into production faster than could be done with any other material.

In addition to speed of production, several other reasons underlay the decision to use wood. Metals were scarce and becoming scarcer, whereas wood was not being fully utilized in the war effort. In the British Isles alone some 12,000 skilled woodworkers were idle because their usual employment had been shut off, and this labor pool could be put to work at once. Finally, unlike their American contemporaries, British and other European airplane engineers had not gone over almost entirely to metal but had continued to design and build wooden aircraft, thereby accumulating a considerable body of information and experience with ships of this kind. Putting the woodworking industry to work has permitted an extraordinary dispersal of production. Some 400 subcontractors are today contributing their share in small and large plants scattered throughout the British Isles and Canada. The Canadian output, as a matter of fact, is a sizable portion of the entire production.

One large question mark in the early days of design was the probable behavior of the wooden structure under enemy fire. The results have been encouraging and enlightening. Bullets or antiaircraft fragments cut through the wood cleanly, leaving only small holes which have a minor weakening effect upon the relatively thick structure. Skilled carpenters can make field repairs, or can replace portions such as wing tips, by simply cutting off the old tip and butt-jointing a new one. Aerodynamically, the wooden structure has permitted a smooth finish, especially on the wings. While camouflage paint has much the same effect on flying speed no matter what the material of the wing may be, the fairly bulky wooden skin is inherently rigid and cuts down on ripples. Furthermore, the plane has no rivets or other protruding fastenings to increase drag.

From a structural standpoint, the two most interesting features of the ship are the fuselage and the wings. Both — and particularly the fuselage — incorporate innovations in design and construction which are in many respects unique and which point the way toward many peacetime applications in aircraft and other wooden construction where lightness and strength are important.

The fuselage skin is essentially a thick sandwich — in itself so rigid that only bulkhead rings and a few fastening members are required in the interior to give it requisite strength. The "bread" of the sandwich is two thin sheets of birch plywood, 1.5 to 2.0 millimeters thick, with the

face plies oriented in the proper direction to afford maximum resistance to the stresses. Between the layers of bread is a filling, or "ham," consisting mostly of balsa wood three-eighths inch thick, but interspersed with the balsa is a system of spruce stiffening members which permit subsequent attachment of wings, bulkhead rings, and interior equipment as well as strengthen the skin around cutouts, such as doors and hatches.

Plywood is made of thin sheets of veneer bonded under heat and pressure in hot-plate presses with hot-setting phenolic resin, or plastic, film. Once bonded, the material is completely resistant to moisture and has a high strength-to-weight ratio. Plywood skins are bonded to the balsa and spruce filling with cold-setting synthetic resins of the urea-formaldehyde type. These harden permanently at room temperatures although the hardening can be accelerated by the application of heat. Casein adhesives, made of curdled milk, are also employed.

National Film Board

Fig. 1

As is shown in Fig. 1, the fuselage is made in two longitudinal sections. This design permits ready access to the interior for the placing of cables, wires, conduit, and other equipment which otherwise would be difficult to install. In this same figure the thick, sandwichlike structure of the skin can be seen. Bulkhead rings, themselves hollow structures of birch plywood on spruce frames, are in place and the interior is being smoothed with ordinary woodworking tools. The two halves are joined at the top and bottom by overlapping pieces of spruce and plywood glued and screwed in place, to effect a juncture as strong and smooth as the rest of the fuselage.

As contrasted with the fuselage, the wings are more conventional, the framework consisting of the two usual spars with ribs disposed between them. The skin departs from ordinary practice, however, in that the upper skin consists of two thin sheets of plywood with square Douglas fir stringers between, to afford a sandwich structure in some ways similar to the fuselage. As shown in Fig. 2, the upper skin becomes an integral part of the spars by

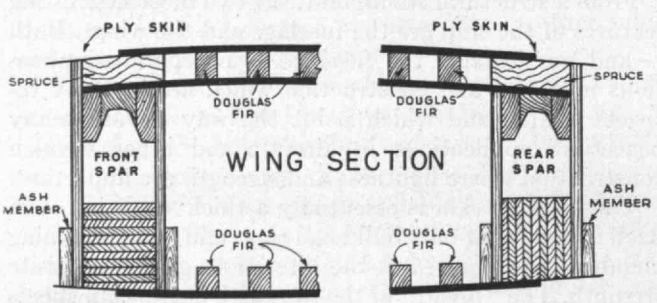


Fig. 2

incorporation of the lower sheet of plywood into the laminated upper flanges of the front and rear spars. The lower surface of the wing is a single sheet of plywood reinforced with Douglas fir stringers. All plywood is glued to the spars, so that a rigid box-structure results, in which the skin not only forms an airfoil but contributes greatly to the strength and stiffness of the wing.

Spars have upper and lower flanges of laminated spruce, with plywood webs, the entire structure being reinforced along the lower edges by strips of ash.

In many aircraft each wing is a separate unit attached to the fuselage. The wings of the Mosquito, on the contrary, are made in one continuous piece from end to end except for the wing tips, which are detachable. Since the fuselage is cut out to fit around this wing unit, the juncture is relatively easily and quickly made, and many of the complicated fastenings generally required to attach wing to fuselage are avoided.

The handicraft methods employed in making this highly advanced type of structure are themselves highly developed, as Fig. 1 indicates. Hand methods are, of course, common throughout the aircraft industry, but they are particularly in evidence in the British approach to the manufacture of wooden aircraft. They are combined with advanced techniques wherever possible, but the high degree of craftsmanship attainable by hand methods is not allowed to suffer.

The molding of a fuselage section is a case in point. A male mold, possessing the exact contours of the inside of the fuselage, is first built of mahogany or concrete. The mold is carefully slotted to receive bulkhead rings and other internal reinforcing members. When fabricating begins, bulkheads and reinforcing pieces are inserted in the slots and coated with adhesive. Interior plywood skin sections, cut to shape, are carefully laid in place and clamped down by numerous flexible steel bands pulled tight by turnbuckles. When glue has hardened, clamps are released, balsa and spruce filling are laid in, and clamps are again pulled down tight. After the second glue layer has hardened, the process is repeated for the outer plywood skin.

Somewhat analogous is the manufacture of the wings, except that the more complex structure entails a greater number of steps and requires, in addition, many gross of small brass screws to screw-glue the plywood skin to spars, stringers, and ribs. Ingenious jigs, fixtures, jacks, and clamps expedite the entire process, but it is still essentially a painstaking handicraft operation.

Although there is no American counterpart of the British Mosquito, the American approach to the molding of wooden aircraft parts has been to attempt the substitution of mechanical methods for hand operations and to speed up the gluing operations both by combining several steps into one and by accelerating the setting of the adhesives.

One approach is shown in Figs. 3 and 4, page 498. A large female mold has been constructed to have the exact contours of the exterior of a fuselage or other molded section. Individual sheets of veneer are laid up directly in this mold, with sheets of thermosetting synthetic resin adhesive film placed between the layers of veneer. If any stiffeners, bulkheads, or other members are to be incorporated into the structure, they can be inserted in slots in the mold or can be tacked into position on the inside after the veneers have (*Concluded on page 498*)

Inventor's Progress

From X-Rays to Automobiles, from Armor Plate to Electric Coffeepots, Hermann Lemp Shared in Accomplishment

By David O. Woodbury

NOT long after Hermann Lemp had left the Thomson Electric Welding Company in the panicky 1890's and had returned to his bench in Thomson's own laboratory, the world was shaken by tremendous scientific news. On November 8, 1895, Wilhelm Konrad Roentgen of the University of Würzburg discovered the mysterious x-radiation. Working doggedly and in secret for many weeks, Roentgen authenticated the phenomenon by innumerable tests, most spectacular of which showed that the rays would penetrate the human body and produce a shadowgraph of the bones on a photographic plate. Realizing the enormous import of this to the medical profession, he presented his findings to the world in January, 1896, making sure thereby that x-rays should be freely investigated by all.

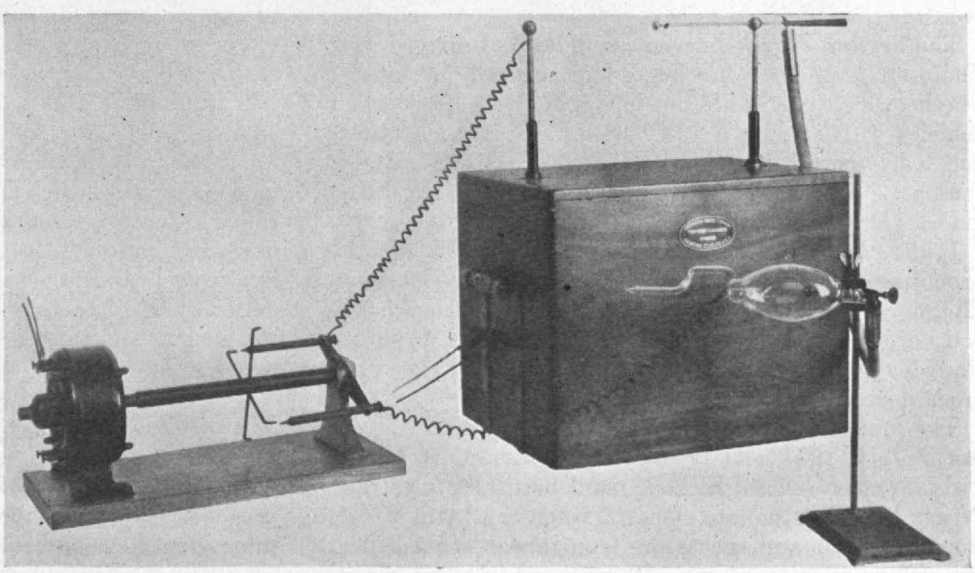
News of Roentgen's work reached America within two days. Instantly scientists, doctors, photographers — everyone who could scrape together the apparatus — dropped everything and went to work. The amazing fact was that the Crookes tubes and spark coils needed to produce the rays had been standard equipment in every laboratory for years. Thus the experimenters were soon numbered in the thousands. Thomas Edison and Elihu Thomson were prominent among them. Professor Michael Pupin of Columbia achieved the first important results, using a modified electric-light bulb as a source of the rays. His photograph of a charge of buckshot lodged in a man's hand was so clear that every one of the shot was successfully removed.

While most workers sought medical applications for x-rays, Thomson and Hermann Lemp began a study of the rays themselves, to determine the exact physical principles involved. The one great obstacle at the time was that x-rays were very weak. The output from even the best tubes was exceedingly small, because the induction coils and static machines used to excite them were inherently so inefficient. Only a tiny fraction of their rapidly oscillating currents flowed from cathode to anode to produce results. The exposure time required to get good pictures was so long that most patients could not stand the strain. What was needed, Thomson saw, was a steady flow of power in the proper direction. This could best be produced by a high-voltage transformer acting through a rectifier. He asked Lemp for a solution of this problem.

Lemp's work with rotary converters gave him a hint. After many trials, he devised a revolving mechanical switch to be used across the secondary of a transformer. The switch was driven by a motor running synchronously with the alternating-current supply. There were no actual contacts; small air gaps, established at every half cycle, completed the circuit from transformer to tube and at the same time suppressed the low-voltage parts of the waves. The resulting current was a pulsating one, all in the same direction.

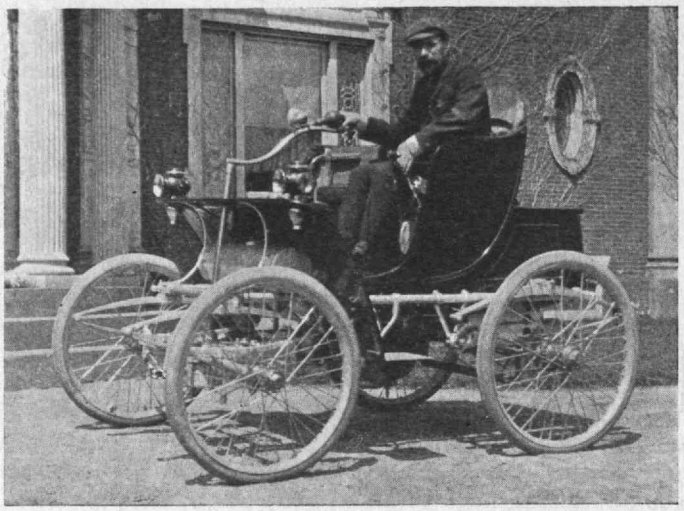
The Lemp "selector," as the device was called, was an immediate success. Large rectified currents could be derived from a closed-core transformer. Here was the answer, it seemed, to the medical need for short-exposure x-rays. But this was not the case. A voltage so continuously applied to the tube invariably melted the metal target in a few minutes. Lemp tried interposing a water resistance, but without result. No tube could be built in 1896 to utilize this important invention.

Thomson was philosophical as usual. "There is a saying in the Good Book," he remarked, "that the bread which you cast upon the waters returns. But it's very often somebody else's bread. The man who invents a thing



A complete x-ray outfit of 1896, comprising Hermann Lemp's selector (a mechanical rectifier driven by a synchronous motor), a Thomson inductorium, and an early x-ray tube

General Electric



At the left, Mr. Lemp at the controls of a well-loaded "electric wagonette" — the first built at Lynn in 1897. From electrics, the team of Elihu Thomson and Hermann Lemp turned soon after to steam carriages. To these Lemp contributed the coiled-tube flash boiler, the nonreversible steering linkage, and the internal expanding brake. At the right, he is shown in the steam victoria that once turned over backward because of high torque and high center of gravity.

ahead of time is usually forgotten by the late-comers, who get the credit."

Ruefully Lemp took out patents on his invention and put the whole matter out of his mind. But Thomson's gloomy prophecy did not come true. About 15 years thereafter, William D. Coolidge, '96, invented the modern hot-cathode x-ray tube with its tungsten target. With air or water cooling, the tube could stand enormous power. Immediately the Lemp selector suggested itself and was developed and improved for the job. Soon hospitals and doctors' offices everywhere were using the device the Swiss inventor had so sadly put behind him. The selector remained standard equipment throughout the medical world until a few years ago, when the vacuum-tube power rectifier took its place.

When the x-ray excitement had died down, the team of Thomson and Lemp turned its attention to another fascinating field of research just coming over the horizon. This was the development of the "horseless carriage." Ten years before, the electric motor had successfully removed the horse from the streetcar but had replaced him with long stretches of copper wire and a central power plant. Now, inventors were trying to emancipate transportation from all visible means of locomotion whatever.

The first crude gasoline automobiles had arrived, but Thomson, immersed in electricity, naturally wondered whether electricity could not be applied to self-propelled vehicles with equal effect. Charles F. Brush and others had long ago developed a pretty good storage battery; compact, powerful, direct-current motors were being made. The combination ought to work.

It did. Lemp's most important contribution was the principle of lengthening the wheel base of the vehicle and slinging the heavy weight of the battery beneath the body of the carriage, to keep the center of gravity down. The idea quickly caught on and has been used ever since in all electric vehicles.

The first electric carriage made in Lynn was ready to run in July, 1897, and Lemp proudly invited Walter C. Fish, '87, the General Electric plant manager, for a ride. Wisely he chose the late evening, when the Lynn streets would be clear and spectators few. It was a good idea. After a ride of a considerable distance into the country, the main drive pinion broke; Lemp spent most of the night locating a horse and getting the experiment home.

The electric carriage soon lost the inventors' interest. It was too tame and had too short a free radius from the charging outfit. "It's like a calf," the professor told Lemp. "If you move it, you have to take the cow along too." So they switched to the steam carriage, just then coming to popular notice.

While Thomson devoted his time to inventing the uniflow steam engine, which greatly improved thermal efficiency by exhausting cool steam at the bottom of its stroke, Lemp applied his knowledge of electric welding to the making of a coiled-tube flash boiler. Other inventors were finding it extremely difficult to make the joints in their boilers strong enough to withstand the high pressures needed in such a small outfit. Lemp's welded boiler — in effect, one continuous piece of tubing with no mechanical joints at all — remedied this trouble and removed the danger of the public's being blown up with high-pressure steam. Having done this, he went on to produce the nonreversible steering linkage, which prevented road shocks from reaching drivers' hands. Then he added the internal expanding brake. Both inventions are common to all types of automobiles today.

The outfit that soon ventured upon the Lynn streets, although it was fired by slow-burning kerosene (Thomson was afraid of gasoline), had more power than the average layman could manage. Steam enough to start the carriage rolling could be generated in about 10 minutes. From that moment on, the flash boiler gave it the energy of a torpedo. Indeed, the torque on the rear wheels was so violent that once, going up a steep hill, the carriage reared up on its hind wheels and turned upside down, pinning Lemp underneath. He had the presence of mind to turn off the steam and was extricated, unharmed, by his assistant, who had been thrown clear.

General Electric built a few steam carriages for the purpose of establishing the designs, then sold the Thomson and Lemp inventions to other manufacturers who specialized in automotive work. Both engineers were satisfied. They were more interested in pioneering than in subsequent development.

The sudden gathering of war clouds in 1898 found the welding company on a sound footing once more and looking for new applications everywhere. Lemp brought a novel and important use of the welding technique out of the emergency. For the past two years the United States Navy had been building two great new battleships, the *Massachusetts* in Philadelphia and the *Oregon* on the West Coast. They were to be the first in the world to carry Harveyized armor on their gun turrets — provided that the drilling and cutting of the steel could be accomplished during installation.

Lemp at the time was trying out an idea for an electric torpedo, powered by a cable from shore, and was spending his evenings rowing about Lynn harbor retrieving the missile after false starts. One night he read in the paper that Navy machinists required 16 hours to drill one hole two inches deep in the *Oregon*'s armor plate. It was feared that neither battleship would be completed in time to enter the Spanish-American War if it came. Last-minute changes in design made it impossible to cut the holes before the steel was hardened. Annealing by blowtorch had failed entirely.

The thought flashed through Lemp's mind that the welding machine might be applied to the job. Its slow, even heat could be localized precisely where annealing was needed. Obtaining a 100-pound chunk of armor steel, he lugged it one night to Boston, where the only welding outfit powerful enough was at work on the West End Railway. Heating several spots in his sample, he took it back to Lynn next day and tried to drill test holes in it. The drills broke, for the steel was as hard as ever. Lemp puzzled over the failure and then suddenly saw his mistake. The steel was so massive that it chilled the moment the welding current was removed, and hardened itself again. Hurrying back to Boston he made another try, this time slowly tapering off his current so that chilling could not take place. The plan worked; he could drill his holes with ease in a few minutes.

Thomson was much excited over the discovery and at once got in touch with Captain (later Rear Admiral) William T. Sampson at the Navy Department. Sampson was delighted and replied that he thought naval red tape could be cleared and an order for special welders placed in about three months.

When Lemp heard this news, he was furious. Did the Navy suppose that the Spaniards would wait for American battleships to be armed? Nevertheless, he went ahead and built the welders anyway. True to his word, Sampson got the order through in just three months and the Navy, in a sudden burst of speed, backed a special train into the Lynn factory, loaded the welders, and took them to the shipyards by express. By means of this invention the *Oregon* was completed in time to sail around Cape Horn and help sink Cervera's fleet at Santiago de Cuba.

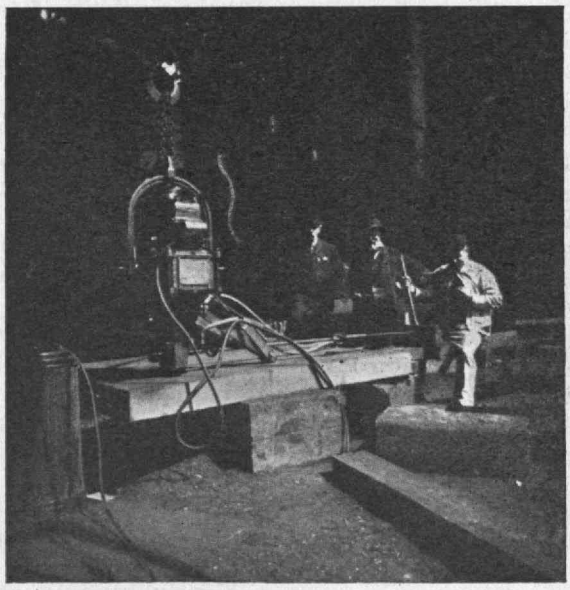
Soon after this success, Hermann Lemp went to London to sell the idea to the British Admiralty. The First Lord gave him a rather frosty reception. "We English," he began, "do things differently from you in America. We bore our holes in the right places before we Harveyize."

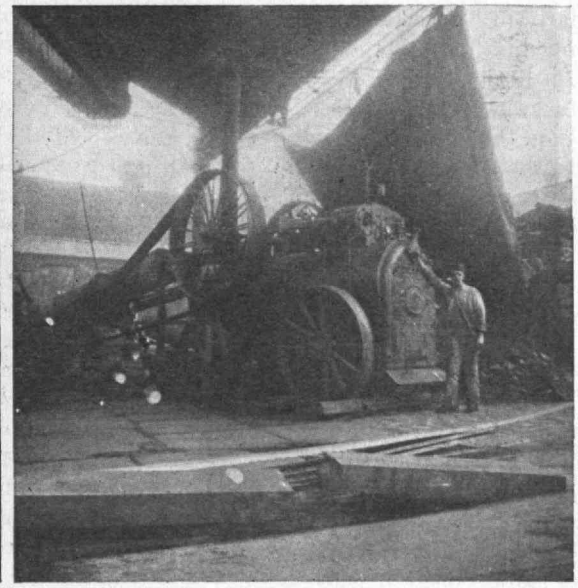
Lemp chatted along with him pleasantly. "You never make mistakes, then, admiral?" he asked finally.

"Never!" the First Lord asserted, and then added with a smile, "Well, hardly ever! The truth is, Mr. Lemp, though we dislike to admit it, we have had so much trouble cutting gun ports that we have abandoned surface hardening altogether."

Lemp got his chance to demonstrate the electric annealing process. But it was an uphill fight, for the British were very skeptical. Grudgingly they sent him to a Sheffield arms plant to make his tests, then hastily refused him admission to the factory. He was forced to do his experiments outdoors. Their excuse was that they had once taken a sick beggar into the plant in a snowstorm; next day the beggar had disappeared with an important secret formula.

Hermann required a steam engine to drive his welding generator, but the English did not have one available. They promised to put one on order. After he had waited around a long time, his Yankee inventiveness rebelled. Waylaying a steam lorry that drove by one morning, he hired this traveling steam engine on the spot, belted his generator to it, and got his (*Continued on page 500*)

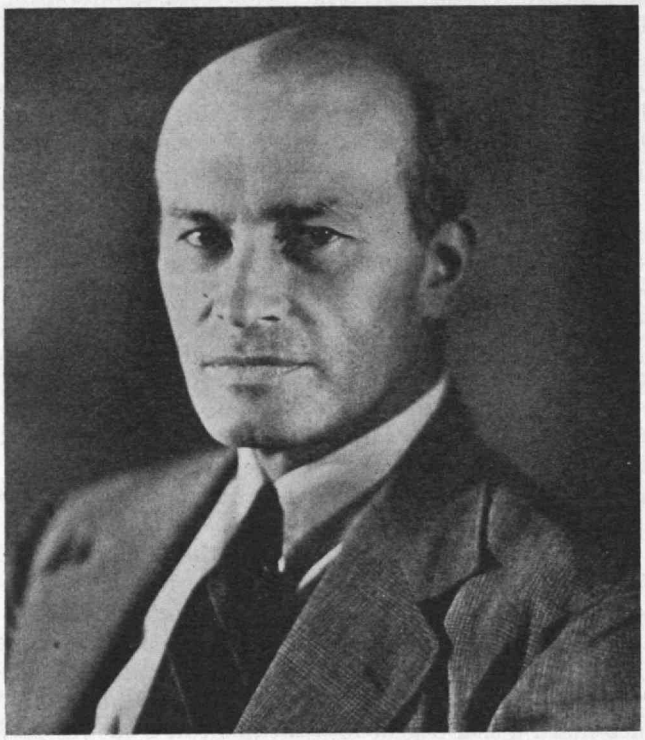




After his adaptation of electric resistance welding to the localized annealing of Harveyized armor plate to facilitate drilling had helped speed completion of the U.S.S. Oregon, *Lemp took the technique to England, where after skepticism had been overcome the process was adopted by the Admiralty. At the left, the annealer is shown in position over a piece of armor plate in a Sheffield arms plant. At the right is the steam lorry which Lemp had to kidnap to drive the generator for his first demonstration of the process in England.*

THE INSTITUTE GAZETTE

PREPARED IN COLLABORATION WITH THE TECHNOLOGY NEWS SERVICE



Theodore B. Parker, '11

Theodore B. Parker, 1889–1944

THEODORE B. PARKER, '11, Head of the Department of Civil and Sanitary Engineering and former chief engineer of the Tennessee Valley Authority, died on April 27 after a long illness. His distinguished career in civil engineering had included identification with many important undertakings, particularly in hydroelectric development. Upon his relinquishing his post as chief engineer of the Tennessee Valley Authority to return to the staff of the Institute, where he had served as an assistant for a year following his graduation, the board of directors of the Authority paid tribute to the "integrity, imagination, and high technical skill" with which he had carried out his responsibilities, and cited his as a "great contribution to the development of new methods of organizing and managing the planning, design, and construction of T.V.A.'s engineering works."

Professor Parker, who was in his fifty-fifth year, was a native of Roxbury, Mass., the son of Franklin Wells and Sarah Bissell Parker. His preparation for entrance to the Institute was done at the Wellesley High School, from which he was graduated in 1907. Upon his graduation from the Institute in 1911, he became an assistant in the Department of Civil Engineering, a year later joining the staff of H. C. Keith, consulting engineer, of New York City, as a draftsman and computer on highway bridge design.

His long period of specialization in hydroelectric development began in 1912, when he became assistant hydraulic engineer for the Utah Power and Light Company. The construction of new power developments on the Bear River in Idaho and the reconstruction of the existing hydroelectric system in Utah were the projects with which Professor Parker was connected during this period. This work he left in 1917 to enter the service of the country, commencing as first lieutenant and later becoming captain, commanding Company D of the 26th Engineers in service overseas. His military activity was to be resumed later, for after the first World War he re-entered the Army, serving as a captain in the Corps of Engineers from September, 1920, to November, 1922, the time including a year of duty with troops and a year at the Army Engineer School, where he was graduated in 1922.

Professor Parker's second tour of duty with the Engineer Corps had been preceded by a period as assistant hydraulic engineer with the Electric Bond and Share organization. During this, he was engaged in investigations and reports regarding powersites on the Platte, Loup, and Niobrara rivers in Nebraska and the Susquehanna, Delaware, and Lehigh in Pennsylvania. For a decade following his service with the Engineer Corps, Professor Parker was associated with the Stone and Webster Engineering Corporation as hydraulic engineer. In this post, he was active in various important hydroelectric undertakings, including the Bartletts Ferry project near Columbus, Ga., and the Rock Island development on the Columbia River in Washington.

After four months in the spring of 1933 as a reserve officer at the United States Army Command and General Staff School at Fort Leavenworth, where he received a commission as lieutenant colonel in the Corps of Engineers Reserve, which he subsequently resigned, Professor Parker became a member of the engineering staff of the Federal Emergency Administration of Public Works. Here he served successively as engineer examiner, state engineer, and acting state director for Massachusetts.

Named chief construction engineer for the Tennessee Valley Authority in 1935, with headquarters at Knoxville, Tenn., Professor Parker directed the completion of the great Norris and Wheeler dams. At that time, Pickwick Landing Dam had just been started, and the Chickamauga, Guntersville, and Hiwassee dams had only been authorized. The tremendous development of the Tennessee River and its tributaries, involving the design and construction of these dams and, in addition, the completion of three other large main river projects as well as eight major developments on tributary streams, went forward under the general direction of Professor Parker as chief engineer, to which post he was advanced in 1938. He continued in this position until July, 1943, when he was appointed head of the Institute's Department of Civil and Sanitary Engineering.

Professor Parker was a member of the American Society of Civil Engineers and a director of the Society of American Military Engineers. He is survived by Mrs. Parker, the former Estelle Peabody of Wellesley, Mass., to whom he was married in May, 1913; by a son, Franklin P. Parker, '36, now a captain in the Corps of Engineers of

the United States Army, serving in the Far East; and by a daughter, Nancy, a student at Wellesley College.

Liaison

PRIMARY among the business at the 238th meeting of the Alumni Council, held on the last Monday in April at the Smith House in Cambridge, was the presentation of their report by the special committee named to consider the possibility and desirability of appointment of a full-time Alumni Association officer to function as an assistant to the President of the Association. The committee comprises Henry E. Worcester, '97, Arthur L. Townsend, '13, Leicester F. Hamilton, '14, Marshall B. Dalton, '15, and Lawrence Allen, '07, chairman, who presented the report to the Council.

Citing the premise that during the readjustment from war to peace the Institute will need all the help that its Alumni can give and, among others, the fact that the Association now has no full-time officer, the committee recommended the creation of such a post. The liaison officer, the committee held, should have his headquarters in Cambridge and should be an alumnus of Technology. He should be of sufficient maturity and accomplishment to command the respect of all age groups who should be interested in the future of the Institute, including potential students, undergraduate and graduate students, Alumni and Alumnae, and leaders of industry. Further, the report declared, he should be acceptable to the Institute administration and capable of rendering them service, and, if possible, should have had an intimate association with the Institute administration and staff, so that he thoroughly understands the organization, operation, aims, history, and traditions of Technology.

The presentation of the report had been preceded by explanation that no discussion or action on it was planned for this meeting of the Council. Hence it was voted to accept the report with grateful appreciation to the members of the committee and to have it circulated for full discussion and possible final action at the May meeting of the Council.

Francis J. Chesterman, '05, President of the Association, who presided at the meeting, thereafter called for regular reports, in the course of which Charles E Locke, '96, Secretary, presented nominees for election to various committees, who were voted in as follows: Assemblies: Larcom Randall, '21, chairman, John T. Rule, '21, James Donovan, '28, and Robert C. Casselman, '39, all for one year; Audit and Budget: R. Charles Thompson, '13, for three years; Historical Collections: Avery A. Ashdown, '24, for five years; Honorary Members: James A. Pennypacker, '23, for three years; Nominating Committee for Departmental Visiting Committees: John A. Lunn, '17, and Carlton E. Tucker, '18, three years; Alumni Fund Board: Francis J. Chesterman, '05, five years.

At the conclusion of the business session, President Chesterman introduced Carroll W. Boyce, 10–44, President of the Gridiron Society and former general manager

The residence of Elihu Thomson, scientist, who was for many years a member of the Institute Corporation and nonresident Professor of Electrical Engineering and for two years Acting President, has been purchased by the town of Swampscott. It will be converted into a town hall as a memorial to the town's dead in all wars, thus fulfilling a wish often expressed by Professor Thomson. Henry S. Baldwin, '96, a close friend and co-worker of Professor Thomson, was active in the completion of arrangements for the transfer.

Florian de Narde

Newly redecorated, the home of the Technology Club of New York was the scene of a housewarming and a dinner to President and Mrs. Compton in March. Shown here is the men's lounge in the club building.

of *The Tech Engineering News*. Mr. Boyce summarized the situation of undergraduate publications at the Institute in wartime days, describing difficulties due to man-power shortage and labor turnover, but showing that the four publications are maintaining their standards as well as their schedules.

Presented as speaker of the evening, Carl M. F. Peterson, '29, superintendent of buildings and power, described vividly some of the problems of keeping the wheels of the Institute turning smoothly at present. The great increase in facilities which the war research program has necessitated meant of course a marked increase in the work of the department of buildings and power. Since 1938, the Institute's plant has been increased 740,000 square feet in area or 10,121,000 cubic feet in volume. This latter increase amounts to 32 per cent of the volume occupied in 1938. Economies in operation and in other respects have made it possible to keep the increase in heat requirements below the increase in space. Thus in 1938 heating demands called for the generation of 229,000,000 pounds of steam, a figure which was actually decreased to 224,000,000 in 1943. Another physical problem has been that of the supply of electric power, demand for which has increased from the 4,743,000 kilowatt-hours of 1938 to 8,700,000 in 1943, with the expectation that for 1944 the figure will be about 10,600,000. Complicating these physical problems but often relieving them with a touch of humor are psychological questions which necessarily arise when large groups are working under pressure, and space, time, efficiency, and comfort are all at a premium. Mr. Peterson's presentation of the lighter aspects of his subject was adroit and amusing, and his entire talk was pleasantly received.

New Undertakings

A MEMBER since 1920 of the staff of the Department of Civil and Sanitary Engineering, Kenneth C. Reynolds, '25, has resigned from the Institute to accept an appointment as head of the department of civil engineering of Cooper Union, and Thomas R. Camp, '25, Associate Professor of Sanitary Engineering in the same Department, has resigned to establish a consulting service in sanitary engineering.

Dr. Reynolds, who was associate professor of hydraulics, is a graduate of Tufts College in 1919. He received his master's degree from Technology in 1925 and his doctor's degree in 1937. He was the recipient of the John R. Freeman Traveling Fellowship awarded by the Boston Society of Civil Engineers, under which he carried

Dr. and Mrs. Compton at the dinner in their honor for the housewarming of the redecorated quarters of the Technology Club of New York. Mrs. Compton is chatting with Mrs. Gordon S. Rentschler. At Dr. Compton's left is Robert E. Wilson, '16, with Mrs. Wilson. Mr. Rentschler is at the end of the table, and John E. Aldred, like Mr. Rentschler a life member of the Institute Corporation, is opposite Mrs. Rentschler.

on advanced studies in hydraulic engineering in Europe during 1927 and 1928. Upon rejoining the Institute staff in 1929, he began a series of important studies of waterway problems. Professor Camp, a graduate of the Agricultural and Mechanical College of Texas in 1916, received the degree of master of science at the Institute in 1925. He started his professional career in 1920 as an engineer in Texas and later was a member of the firm of Spoon, Lewis and Camp in North Carolina.

Instruction in sanitary engineering is being continued under the direction of William E. Stanley, who is on leave of absence from Cornell University. Professor Stanley held the rank of professor of sanitary engineering at Cornell until 1941, when he became chief, sewerage and incineration, construction division, War Department, in charge of the planning and design of sewerage works for camps and ordnance manufacturing plants. From July, 1942, to April, 1944, Professor Stanley held the rank of major in the Corps of Engineers in the United States Army and was staff water supply officer for the North African invasion and the Tunisian campaigns for seven months, when he was appointed chief of the construction branch, Headquarters Service of Supply, of the North African theater of operations.

Elected

RETURNS from recent balloting for officers of the Alumni Association, for terms beginning July 1, are: Raymond Stevens, '17, President; Alfred T. Glassett', 20, Vice-president for two years; John D. Mitsch, '20, and James Donovan, '28, members of the Executive Committee for two years. Dr. William Jason Mixter, '02, and Harold B. Harvey, '05, have been elected members of the Institute Corporation for five-year terms. Lewis W. Waters, '10, nominated for the third alumni term membership, died as the election was in progress. For membership on the National Nominating Committee of the Association, the contest resulted in the election of Albert W. Higgins, '01, to represent District 8; Harry L. Havens, '09, District 9; and Charles H. Toll, Jr., '23, District 10.

Class representatives on the Alumni Council were elected as follows: Arthur K. Hunt, '85, Harry M. Goodwin, '90, Henry D. Jackson, '95, C. Burton Cotting, '00, Robert W. McLean, '05, Herbert S. Cleverdon, '10, Azel W. Mack, '15, Edwin D. Ryer, '20, F. Leroy Foster, '25, Parker H. Starratt, '30, Dudley A. Williams, '35, and John L. Danforth, '40.

Title

FIFTEEN Technology undergraduates shared in rolling up a total of 32½ points to win the New England Inter-collegiate A.A.A. track and field championship in the 57th annual games, which were held on May 13 this year at Briggs Field. Nosing out Tufts by that half point, they thus brought home the first such title for the Institute since 1926. Since the Technology cross-country runners last fall annexed the New England Inter-collegiate A.A.A. cross-country title, the Institute can lay a fair claim to top track honors in the New England area for the present school year.

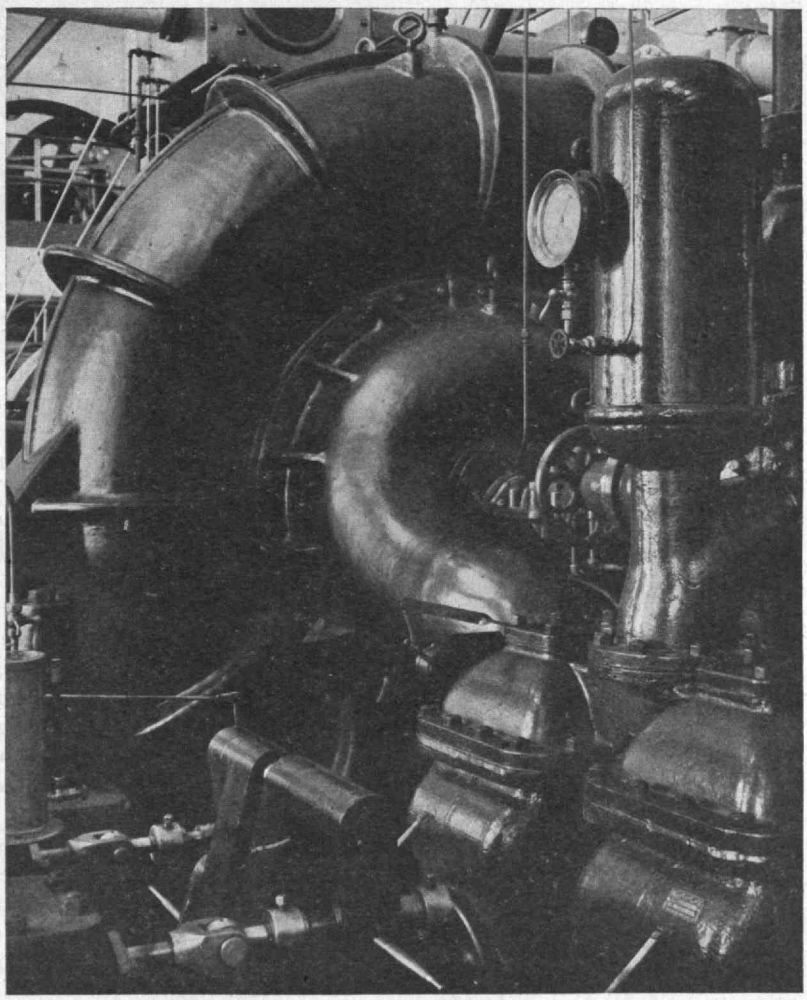
First places were won in the 880-yard run by Arthur L. Bryant, 10–44, of Binghamton, N. Y., captain of the track team; and in the pole vault by Peter S. Wright, 2–46, of Philadelphia. Technology's win in the meet as a whole resulted from balance in other events.

On the same day at Annapolis, Md., the Institute varsity crew lost by just about the same margin as the track team had won. Maintaining a slight lead until the final stretch of the one and three-quarter mile course, the Technology oarsmen finished a tenth of a second behind the Navy shell, the winning time being 10:34. The Navy eight got home by a scant foot ahead of the Engineers. Cornell was third, trailing by six or seven lengths, and Columbia was a poor fourth.

Visiting Committee Report

A MEETING of the Committee on the Department of Electrical Engineering* was held in New York on January 25. At that time, it was (*Continued on page 511*)

* Members of the Committee for 1943–1944 are Francis J. Chesterman, '05, chairman, Harold S. Osborne, '08, Philip H. Chase, '09, Vannevar Bush, '16, Lee A. DuBridge, Ralph E. Flanders, and Reginald E. Gillmor.



Sturdy yet curvaceous is this pump in the Institute's steam laboratory.

M.I.T. Photo

MOSQUITO ENGINEERING

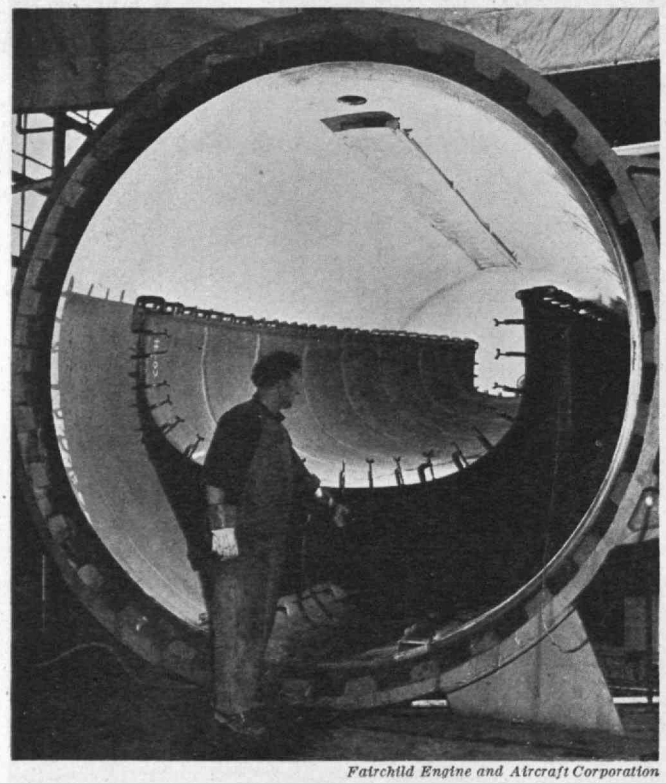
(*Concluded from page 490*)

Fairchild Engine and Aircraft Corporation

Fig. 3

been placed. Everything is stapled, taped, or tacked into position. The structure is then enclosed in a flexible blanket or bag and may be placed in an autoclave. By evacuation of the air inside it, the blanket can be drawn down snugly against the form, pressing veneers and other members together. Steam, air and steam, or hot water is then let into the autoclave, increasing the pressure and raising the temperature to perhaps 250 to 300 degrees F. At this elevated temperature the synthetic resin first fuses and then hardens in a matter of minutes. From the cooking operation the assemblage emerges as a complete structure.

Evidently, this procedure does not eliminate handwork. Painstaking care is required in placing the veneers and other members. Complex structures such as wings do not lend themselves too well to this procedure and must be made up in smaller sections which in turn are put together largely by hand methods. Here again, however, ingenious jigs and fixtures, coupled with strip resistance heaters, flexible hydraulic tubes to apply uniform pressure, and high-frequency induction heaters, are being employed to reduce hand operations and to speed the setting of adhesives.



Fairchild Engine and Aircraft Corporation

Fig. 4

Constant changes in design make the full application of highly automatic methods difficult in the manufacture of fighting aircraft such as the Mosquito. Many peacetime articles of commerce, however, will be much less subject to change and will, moreover, be much simpler than aircraft. The techniques being evolved for the molding of aircraft parts will be extended to wood, plastics, and combinations of these with paper, textiles, and other materials. Together with increased knowledge of the engineering properties of these materials, they should result in highly improved products for peacetime use.

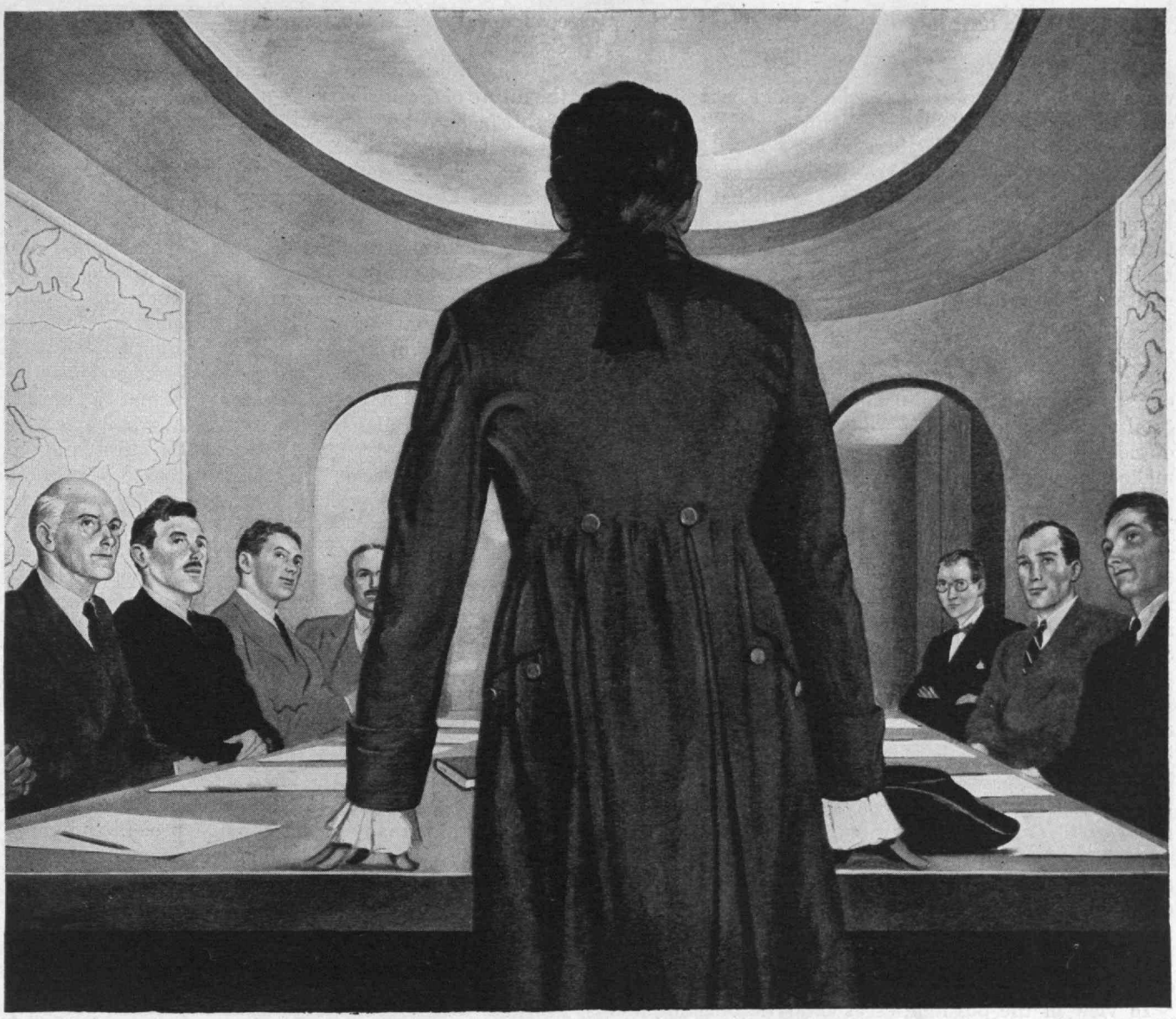
MULTIPLIER OF RESOURCES

(*Continued from page 485*)

airplanes, could not even operate. Of course, the confirmed pessimist can still say: "But these are all discoveries that have been made once and hence cannot be made again. Whence will come our new methods of finding and refining petroleum?" The only answer I can give is that they will come from the same research and development organizations which have achieved these results during the past quarter of a century. I cannot predict even the nature of most of these coming developments, any more than could the scientists of 1918 have guessed at what we have seen, but I do know that we have about 50 times as many research workers as in 1918 and that they have not lost their ingenuity. Many important developments are bound to result from the scientific work of this war, just as occurred after the first World War. Large new areas of potential oil territory are being intensively explored for the first time, and some of them already show real promise. Even larger areas in near-by countries have major potentialities of supplementing our own crude reserves as the need arises.

One possibility which seems certain to develop rapidly after the war is the synthesis of gasoline from natural gas, our proved reserves of which, measured as total heating value, are nearly as large as those of crude petroleum (though much of these gas reserves is earmarked for other purposes). Of course, our known reserves of tar sands, oil shale, and coal are each enormously greater than those of oil, and better methods of handling and making refined products from them are certain to be developed. Even today we know how to make unlimited quantities of gasoline from each of these sources at prices lower than those prevailing after World War I, though large new investments would, of course, be required. Both investment and operating costs will undoubtedly be reduced substantially before the time these processes are really needed. Competent technical opinion today assures us that, given a few years of development, gasoline can be made in limited quantities from the richer oil shales, and in unlimited quantities from coal by the Fischer process, at costs not more than five cents a gallon above present gasoline costs. There is certainly far less present cause for concern as to future supplies of liquid fuels than there was in 1918,

(*Concluded on page 500*)



In the spirit of Paul Revere

It was not on the spur of the moment that Paul Revere rode to warn the sleeping country folk of danger. *He had been watching the British for two years.*

No one ordered Paul Revere to discover the secret of rolling copper and to set up a plant for doing it, in order to serve the new U. S. Navy. *It was his suggestion.*

No one commanded Paul Revere to cast cannon for the government, to manufacture gunpowder for the Army, to continue shaping lovely silverware for the newly-made American citizenry. These were just jobs that needed doing. *He undertook to do them.*

The spirit of Paul Revere was the spirit of enterprise—in the exact sense of the word's definition: an undertaking requiring boldness, energy and perseverance. And it is in that spirit that the business which he founded has been carried on. Through the course of American history, we have steadily anticipated industry's demands for copper and copper-base products. We have steadily enlarged research, production and service facilities, and so have often enabled our customers to cut their costs or to improve their products.

We are pioneering today in the production of light metals in anticipation of changed requirements of industry when it finally begins to mobilize for peace. For the management of this business is determined to be ready to help you meet America's needs tomorrow, by having the right metal, at the right time, for the right price, available on instant call. To this end, we maintain most complete metallurgical data. This data is at your disposal without charge or obligation, for any post-war problem. Write to Revere Executive Offices, 230 Park Avenue, New York 17, N. Y.

REVERE COPPER AND BRASS INCORPORATED

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FABRICATORS OF COPPER, BRASS, MAGNESIUM, ALUMINUM, BRONZE AND STEEL

MULTIPLIER OF RESOURCES

(*Concluded from page 498*)

when we did not know that gasoline could be made from either natural gas or coal.

While I feel that all these factors afford adequate grounds for optimism as to the future of the petroleum industry and those dependent on it, I trust that nothing I have said will imply lack of need for increasing our efforts toward sound conservation practices in every branch of the industry. For one thing, technology has not only multiplied our available supplies of oil but has also multiplied uses for it as an essential raw material for making rubber, plastics, explosives, and dozens of other high-value products. We must also never forget that whatever our success in finding and using oil more effectively, our total underground reserves are being drawn upon. If we do not use effectively the means science has supplied to make conservation possible, we are not worthy of either the resources or the technology with which we have been so generously endowed. Yet it is a deplorable fact that some important oil-producing states still do not have adequate conservation laws, and that an inflexible price policy is causing small wells to be shut down every week and is preventing the introduction of secondary recovery operations in many fields.

In the future, designers of automotive equipment should, and I believe will, place more emphasis on economy. To date, most of the improvements in gasoline quality and engine design have been used to make possible roomier and heavier cars, and more flashy performance. Hence there is much room for conservation in the automotive field, especially in view of the better, but probably somewhat more costly, gasolines which will be available after the war. Slightly higher compression ratios, lower car weights, and more extensive use of automatic transmissions geared for economy could easily raise car mileage by 30 per cent without any considerable increase in first cost or decrease in performance.

In view of the possibilities of catalytic cracking and hydrogenation, heavy fuel oil should probably no longer be sold in direct price competition with coal for use in large power installations; but where factors of cleanliness, convenience, and laborsaving are important, fuel oil can continue to be supplied as a by-product from noncatalytic cracking operations and through importation. The current shortage of household fuel has already stimulated more efficient use thereof in most homes, and there seems no reason to doubt the adequacy of future supplies of this product which means so much to the comfort of homeowners.

Increasing importation of heavy fuel and asphaltic crudes seems desirable in order to keep our coastal industries and shipping supplied with heavy fuel at reasonable prices and at the same time to encourage American refiners to convert domestic crudes into maximum yields of gasoline and other light products. However, if such importation is to aid and not hurt the conservation of our own reserves, it must be managed so as not to keep domestic crude prices below the point which will encourage the search for new oil pools and the continued operation of stripper wells, and at the same time will maximize secondary recovery operations and many other conservation practices. Any sound national oil policy must recognize these essential facts, and must be based on sound economies and technology rather than on political expediency.

To my mind the most serious and imminent danger to the future of our industry lies not in the possible shortage of satisfactory raw material but in certain threats to the future of the very research and technology which are, as I have shown, the indispensable multiplier of our natural resources. Demands for regimentation and government domination of research, if yielded to, could easily devitalize our whole research program. Equally serious are the attacks on our patent system, without which not only should we lose much of the incentive to research, but most of those who continued their research would revert to the dark ages of secret processes and cease prompt publication of their discoveries. Such action would tremendously retard the progress of science. A patent is primarily a reward for prompt and full disclosure so that the whole scientific world can make progress in the light of the latest information in any given field. The resultant tempo of research and invention in America has made us the envy of the whole world.

Political attacks on patents urge that abolition of them will aid small companies, but this contention overlooks three vital factors: First, many of our most important companies could never have survived their early years had not patents given them protection from larger competitors which could otherwise have copied their inventions and outsold them, through being better known or having wider distribution; second, many small companies could not finance their relatively large research programs and keep in the forefront of competition were it not for income received from licensing their patents to others; third, many small companies prefer to minimize their own research and development expenditures and use on a reasonable royalty basis, complete with all the know-how, whatever turn out to be the best processes developed by any of their competitors. Emasculation of our patent system would do far more injury to small than to large companies, as the latter could afford to continue their research regardless of patents, and keep their important results to themselves as long as possible.

In other words, both the hope of, and the danger to, America lie more in the field of mind than of matter. The only thing that can prevent our country from having abundant liquid fuel for many generations, at reasonable prices — certainly lower than those of 25 years ago — is interference with the free play of technology and competitive enterprise.

INVENTOR'S PROGRESS

(*Continued from page 493*)

welder into service. The annealing demonstration succeeded at once; the Admiralty changed its tune and ordered a number of welding outfits. Eventually the use of Harveyized turrets was resumed, both in England and in other European countries, and it was destined to remain standard practice in the navies of the world for many years.

At the turn of the century Lemp's connection with Elihu Thomson ended. The professor was veering off into scientific investigations and international engineering affairs. Hermann moved to other plants of the General Electric Company and presently was appointed works

(*Concluded on page 502*)

O W I Photo by Palmer, in an Allegheny Ludlum Plant

Final Examination

BEFORE STAINLESS GETS ITS WINGS

REDUCE ACCIDENTS!

In 1941, accidents were first cause of death among men from 22 to 38 years of age. The productive man-days lost were enough to build twice as many battleships as now possessed by the combined Allied Navies.

These are losses that *can* be avoided. Don't take unnecessary risks at any time; and later, when you enter business life, remember that carelessness is the single greatest factor in human and economic loss.

A GREAT deal of costly processing is done on stainless steel, to secure the physical characteristics and surface finish required for the particular war job it is to perform. But one day all the rolling, heat treating and surface finishing is completed, and bright sheets of Allegheny Metal lie ready for final inspection and shipment to the war plants.

They're *right,* those sheets—flawless of surface and true to specifications. They'll do their job and more—which is what everything and everybody *must* do, in a war like this. In the case of stainless steel, that job is the supplying of vastly increased strength with equal or decreased weight, and high resistance to heat and corrosion. These are qualities of great value now, and of even greater promise for the future.

AL
STEEL FOR THE NATION'S WELFARE

Allegheny Ludlum
STEEL CORPORATION
BRACKENRIDGE, PENNSYLVANIA

W&D A-9319

INVENTOR'S PROGRESS

(*Concluded from page 500*)

engineer of the railway department at Erie, Pa. When Rudolf Diesel came to America, Lemp met him and became so enthusiastic over oil-engine power that in 1911 he accompanied his colleague, H. G. Chatain, to Europe to study the invention at first hand. Back again on the eve of the War, he proposed a Diesel-electric drive for locomotives. He got scant attention, even when he penetrated to the upper brackets of the management. The top officials called him a visionary; the oil-electric idea languished.

Early in the 1920's, Lemp made an excursion into education as director of plant apprentices. He objected to their being fired during the depression of 1923, pointing out that they could be very useful in revamping machine tools worn out in war production. The arguments which ensued ended with Lemp's resignation from the company. But he was not long without a job. The Erie Steam Shovel Company put him to work designing the first gasoline-powered shovel. The success of this development got him the job of consulting engineer with the Ingersoll-Rand Company, where at last he found a sympathetic ear for his scheme of oil-electric drive for locomotives. Besides acting as a spark plug in the new development, Lemp made an important contribution in the control of locomotive power plants. This was his one-hand controller, which made possible the unifying of the manipulation of engine, generator, and traction motors in a single "johnny-bar."

Not many years later, Hermann had the extreme satisfaction — one that comes to very few inventors — of being present when the child of his brain received the acclaim of the very men who had once cried it down. He was in the cab of the first great Diesel-electric engine demonstrated on the New Haven Railroad, when a galaxy of officials were given a ride. One after another these notables — his former associates — climbed into the cab, only to find to their surprise that Lemp was there to greet them. Hermann smiled delightedly as each one greeted him, finally could not help saying, in his slightly imperfect English, "When I left the company, gentlemen, you called me a visionary. . . ."

"Yes, we did," one of the Vice-presidents returned hastily. "But a visionary is a man of vision. Only vision could have foretold the oil-electric locomotive." Thereafter, Hermann Lemp was an important personage indeed. And his fame is still being broadened every day by the huge giants of this type which pull our streamline trains.

The Diesel-engine work was Hermann Lemp's final contribution to engineering through a large corporation. Shortly he retired and set himself up as a consulting engineer in his New Jersey home. It was here that he built, with loving care and minute attention to detail, some of the engine models that were used at the New York World's Fair in 1939. It is here, too, that he has been putting in some of the happiest and most speculative years of his life.

Lemp today is 81 — a small, quiet, and marvelously alert man, delightful in his humor and in his acceptance of the fact that his contribution to engineering, and not he himself, is prominent. "My mother brought me up," he likes to remember with a twinkle in his bright blue eyes, "to keep always in the background. One day in school in Zurich our severe old teacher decided to thrash the whole class for a question no one could answer to his liking. We were all lined up for our licking. From pure habit (not that I was afraid) I retired to a corner of the room. The master forgot me entirely; in my dislike of prominence, I escaped that licking entirely. Since then I have always found it wise to occupy a corner of the room."

There is not much chance for Lemp to indulge his modest habit in his own home, for every available corner is piled with books, papers, machines partly built, stacks of patents, signed photographs of celebrities. A big x-ray machine fills the parlor and overwhelms the piano; upstairs, the same condition prevails. Peeping out from behind it all, tiny Mrs. Lemp, a perfect cameo in pink and white and as cheerful as Hermann himself, somehow brings order and comfort into his life. Not long ago they celebrated 60 years of a marriage that remained peaceful through the most exciting years of American technical progress.

Latest of Lemp's inventions is an automatic thermostat switch for electric coffeepots. No sooner had someone given him one than he spotted the one weak link in electric coffee making — the fact that you couldn't come downstairs of a chilly morning and have your coffee steaming hot and ready to drink. So he devised the thermostat and added to it a remote-control connection to his bedroom. Thereafter he never arrived at breakfast until the aroma of hot coffee sent its welcome signal through the house. He soon sold the invention and has made a comfortable royalty out of it ever since.

"It is almost the only patent," he says fondly, "that I ever owned by myself. All the rest belonged to the companies I worked for."

In the days when Lemp's three children were small, he found much satisfaction in noting that their ingenuity was like his own — equal to whatever emergency might arise. He chuckles still over the time when his aged mother-in-law came from the old country to live with him. *Bellemère* was much interested in the daily news, but she could neither read nor understand English. Her small granddaughter, who was later to be graduated from the M.I.T. as an architect, could not read it either, but she could translate it into French fluently when she heard it spoken. So the two worked out a scheme for reading the paper every morning. The old lady would stare at each word and carefully sound it phonetically. The child, hearing it, would then render it into French. By slow degrees they would both discover what was going on in the world outside.

"Like the blind man bearing the lame man on his back," Lemp explains, "out of two scraps they made a workable combination." It was a symbol of the way Hermann had added up unrelated parts to make useful wholes all his life.

"To build, out of many parts; to make a single whole — that is what I have liked to do," Mr. Lemp says. "As a very young man I desired to be a surgeon in the city of Bern. But it was not possible. I could do very well with the corpses, but when it came to cutting living people — no! I preferred to cut up copper and steel."

Hermann Lemp will pass into history as modestly as he has lived, occupying his little corner to the last. But it will be discovered then that out of that corner have come many things which will always be known to us all as important elements of our daily life.

FORTY YEARS OF ELECTRONICS

(*Continued from page 488*)

The jump was from phonographs to talkies. The idea was not new; years before, Edison had produced a sound motion picture by belting a phonograph to a kinetoscope. The result, apparently, was not commercially acceptable. One can make allowances for poor quality in reproduced sound if it is not accompanied by action which gives a high illusion of reality. Motion pictures, with their photographic excellence, had to wait for a sound accompaniment of at least equal quality. This the electrical method permitted.

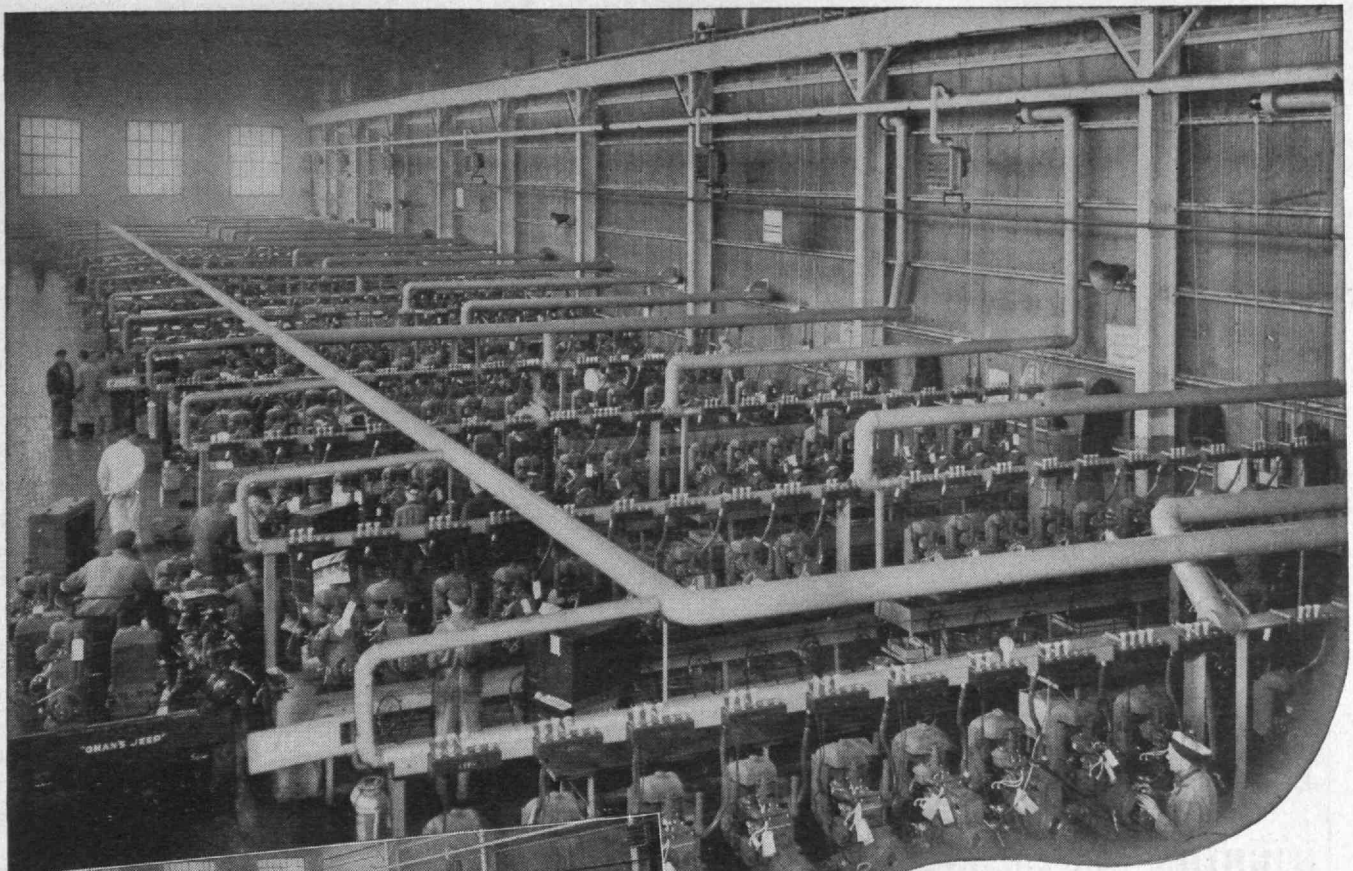
Curiously enough, many movie producers at early demonstrations in the Bell Telephone Laboratories seemed most impressed by the fact that a singer's voice started from the hidden loud-speaker as he opened his mouth in the picture. Synchronization — by gearing together the acoustical and optical mechanisms — had been a short job for a few ingenious men. But the quality of the sound and its faithfulness to the original, which gave aural verisimilitude, were the product of two decades of research by scores of men who had studied the physical characteristics of various sounds, translation of them into electrical currents, and the transmission, recording, and retranslation of such sound-bearing currents. Incidentally, some of the precision apparatus developed for these researches graduated to Hollywood and Broadway; also, in most of them the vacuum tube was an essential instrument.

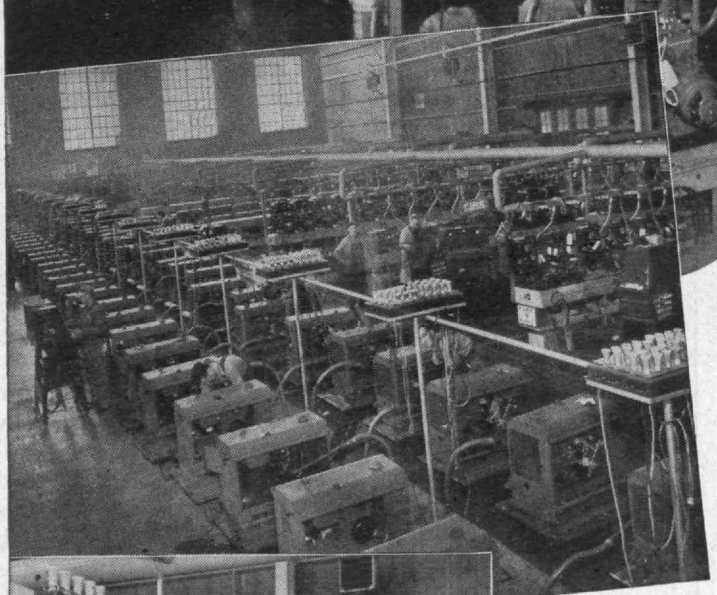
In the phonograph either a graver or a reproducing needle follows a wavy pattern which is a replica, to reduced scale and in a different medium, of sound waves in air. Other mediums can be used — for example, film, in which case the microphone's current varies the amount of light falling on the film and so records a series of striations of varying photographic density — the so-called sound track. There are several ways of making this photographic sound record, but the final results are so nearly alike that an audience usually notes only the difference in the film's credit line to the system employed. Fortunately, the same reproducing equipment serves for all the present types of track; otherwise the motion-picture business would be crazier than it is.

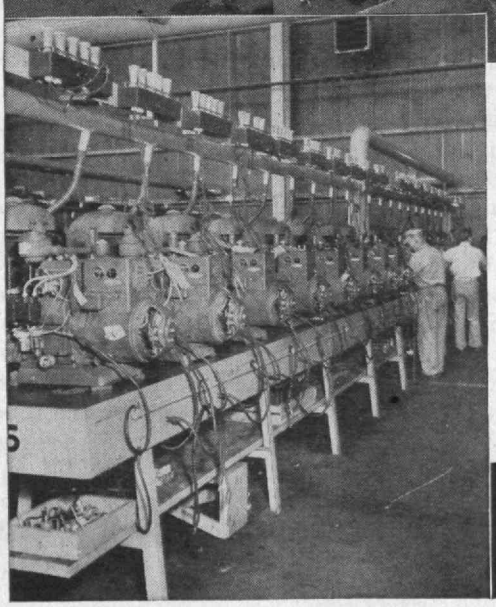
Reproduction from the sound track depends upon the third important member of the electronic tribe — counting the x-ray tube as first and the vacuum tube as second. This is the photoelectric cell, whose electrons are freed by the action of light. That a piece of metal becomes positively charged when exposed to light has been known for years. Under illumination a metal loses electrons, until there is attained a condition of balance reminiscent of the economists' theory of marginal utility. Each electron, as it is knocked out by the photons of light, leaves the metal that much more positive, until finally the attraction of the positive metal is just sufficient either to prevent the next affected electron from leaving or to attract back from the surrounding atmosphere that electron or an identical fellow.

Suppose, however, that near the illuminated metal is a wire, or plate, made attractive to electrons by a battery connected between it and the metal. This positive wire will be a goal for the liberated electrons; they will move to it through the intervening (exhausted) space and then,

(*Continued on page 506*)







Here is One of Many Problems PENFLEX *Has Helped to Solve . . .*

Illustrated, Onan Generators on test in world's largest test rooms.

The Onan plant was one of the first to solve the problem of exhaust heat. They installed PENFLEX Flexible Metallic Exhaust Pipes to convey exhaust heat from generators on test to main distribution system where it is routed to other operations and re-used. A PENFLEX Flexible Metallic Exhaust is packed with each generator to be used wherever Onan sets are found.

Four-wall interlocking joint construction, flexibility, and insulation against vibration make PENFLEX suitable for such a job.

PENFLEX Flexible, All-Metal Hose or Tubing is also available for bilge ventilation, dust collection, coolant conveying, vibration isolation, hydraulic and air controls and many other applications.

Perhaps you, too, have a similar problem. If so, our Engineering Department will help you solve it.

PHOTOS COURTESY D. W. ONAN

PENFLEX METAL HOSE

PENNSYLVANIA FLEXIBLE METALLIC TUBING CO.

7211 Powers Lane, Philadelphia 42, Pa.

ESTABLISHED 1902

FORTY YEARS OF ELECTRONICS

(*Continued from page 504*)

returning through the battery, they will be ready for another run around the conductive circuit. The current will be strictly proportional to the illumination.

To translate from film track to telephone current, a light is arranged to shine through the film as it is drawn past and to fall upon a photoelectric cell. The intensity of the illumination will vary from instant to instant according to the striations on the film track. After amplification by the ever useful vacuum tube — for the photoelectric effect is relatively very feeble — the current from the cell proceeds to the loud-speaker for translation into sound.

It is this photoelectric effect that makes television possible. The transmitter scans the scene, viewing its details seriatim and converting the observations into a current which varies in intensity according to the brilliancy of the details. This so-called video current, after amplification, modulates a radio current, if the information is to be transmitted through that medium. At the receiving station a replica of the video current is obtained and used to control the brilliancy of a beam of light. This beam is played back and forth in synchronism with the scanner to paint a transient picture of the distant scene. The operation is repeated 30 times a second — a rate well within the persistence of vision. For an observer, therefore, the successive pictures merge into a continuous scene just as do the 24 a second of the movies.

For this operation of electrical communication and for its little sisters of picture transmission and facsimile, the photoelectric action must take place in well-evacuated space. Otherwise the current may grow like that of lightning, and its meticulous dependence upon the intensity of illumination be destroyed. There are, however, situations where it is not necessary that the current through the cell shall follow precisely the variations of intensity; what is desired is a quick conversion of energy when a light shines upon the cell. A large and sudden current is desired — more than the feeble photoelectric emission will permit. Gas is therefore introduced into the cell, and a miniature lightning discharge is initiated by the collisions of the few electrons liberated by the light. Strong currents are produced in that way for many purposes. Such gas-filled photoelectric tubes, or phototubes, are the electric eyes of industry, which start or stop motors in accordance with what they see. They open doors or give alarms, turn lights on or off, control continuous processes of manufacture, and sort and grade products on the assembly line, rejecting and diverting those that offend their sight.

The fourth device of electronics is also gas filled, and it bears to the vacuum-tube successors of the audion about the same relation as do phototubes to their vacuum-tube predecessors. Under various names — rectifiers, thyratrons, excitrons, and ignitrons — these new tubes convert alternating current into direct or give rise to large sudden surges of current when "triggered off." The source of free electrons to initiate their miniature lightning is sometimes a heated filament which steadily emits electrons. The electrons are kept from streaming through the tube by a near-by grid which is negatively charged. When the tube is to "fire," a small electrical cause cancels this inhibition, permitting the electrons to start the discharge. In other types the source of electrons is a pool of mercury.

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FORTY YEARS OF ELECTRONICS

(*Continued from page 506*)

When action is to start, a very small amount of electrical power is applied to make a hot spot on the surface of the mercury. Like any heated metal, the mercury then liberates electrons, and in an instant a strong stream is rushing toward the positive terminal of the tube. Devices of these types serve purposes as widely different as welding in shipyards and controlling stage lights in Radio City.

Except for the x-ray tube which one meets in hospitals and dental laboratories, all these devices of electronics are behind the scene to the general public. But that is not true of the cathode-ray tube, upon whose fluorescent butt television creates its scenes. In this pear-shaped tube, electrons liberated at the smaller end by a heated filament — technically a cathode — are drawn across evacuated space to strike as a spot. Their blows disturb the electronic groupings of the atoms on which they fall, releasing flashes of light. A grid near the filament controls the intensity of the stream and hence also the illumination from its impact. The grid itself is radio controlled in correspondence to the light intensity of the scenic detail which is being observed by the photoelectric device in the transmitter. By other control elements in the tube, the beam is swept sidewise and also up and down, in synchronism with the scanning mechanism; and so 30 times a second it recreates the distant scene.

Another mechanism which is today attracting attention but will never be a part of household furnishings is the

(*Concluded on page 511*)

A "Blue Print" for Better Heating

"My job is to design buildings, so naturally I'm interested in anything that will add to the complete satisfaction of my client. Here's my advice when I'm asked about a heating system:

"Install a steam heating system that will guarantee prompt heating up, balanced distribution of steam and even room temperature throughout the building."

The Webster Moderator System of Steam Heating answers all these requirements—economically. Waste of valuable fuel through overheating is minimized, due to an outdoor thermostat which automatically changes the heating rate to agree with changes in outdoor temperatures.

Through actual surveys made by Webster Engineers, we have learned that seven out of ten buildings in America (many less than ten years old) can get up to 33 per cent more heat out of the fuel consumed.

The Webster Outdoor Thermostat automatically changes heating rate when outdoor temperature changes. This device is part of the Webster Moderator System, a central heat control that is saving fuel for hundreds of America's commercial and institutional buildings.

More Heat With Less Fuel

If you are planning building construction or modernization now or after the war, let us show you our "blue print" of better heating... Write for "Performance Facts" and see the great savings possible with the Webster Moderator System of Steam Heating. This free booklet contains case studies of 268 modern steam heating installations in commercial, industrial and institutional buildings.

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Pioneers of the Vacuum System of Steam Heating : : Est. 1888
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ARMY (E) NAVY
Making Boosters for U.S. Army Ordnance

Webster Steam Heating

FORTY YEARS OF ELECTRONICS

(*Concluded from page 508*)

electron microscope, which excites the imagination as did the x-ray tube in its early days. It has some elements of wonder even for a public that accepts marvels without asking how come. In operation it parallels the optical microscope, but it has the advantage of greater resolution. In the optical instrument, specimens can be magnified about 2,000 times their actual size. By photographic processes, of course, further enlargements can be made, but they will contain no more salient features, for that is about the limit of microscopic power. With the electron instrument, on the other hand, pictures having much greater detail can be obtained. And these can be blown up photographically to a total magnification of 100,000 diameters before the present limit is reached.

In these instruments a stream of electrons is directed by electrical or magnetic means through the specimen as light is sent through a microscope slide. The beam is then focused to form an enlarged image on a photographic film. The usual slide is replaced by a very thin layer of celluloid, since glass, like all solids, is essentially impenetrable to electrons. In passing through a microscope slide, light is absorbed to different degrees by various parts of the specimen and photographically records those differences in the photoprojector. Similar pictures are made by the electrons. Also, just as light of shorter wavelength — for example, ultraviolet — permits greater resolution, so do electrons of higher speed. The reason they do is far afield from this article and inheres in the dual nature of the electron. It is either a particle or something like a wave motion. One can assume it to be whichever is better adapted to explain the phenomenon under study. But that is a story of the more transcendental portion of modern physics.

Between the electron which as a bullet strikes the atom-deranging blows that produce x-rays and the electron which as a wave empowers the microscopist to photograph an influenza virus or other invisible entity of biology, then, is the whole range of electronic devices. And electronics, the most amazing engineering art of history, has to do with methods of freeing electrons from matter and with their subsequent behavior and effects.

THE INSTITUTE GAZETTE

(*Continued from page 497*)

apparent that the Department had been required to make material readjustments in its staff and in its educational program to accommodate the requirements of the Army Specialized Training Program and the V-12 men, and that these adjustments had been satisfactorily made. Twenty-one of the 34 faculty members of the Department are engaged in duties connected with the war effort but apart from their ordinary teaching or research duties. As mentioned in the Committee's report last year, this fact has thrown a considerable burden on the remaining staff members. Some relief has been obtained through the engagement of assistants for laboratory work and of graduate students and seniors for the handling of problems and the correction of papers. The uncertainty as to the number of students — not only military but partic-

(*Continued on page 512*)

THE INSTITUTE GAZETTE

(*Continued from page 511*)

ularly civilian — makes the forecasting of the required staff indefinite. Because of the need to conserve staff, it has been necessary to discontinue Option 2, illuminating engineering, temporarily with the present graduating class. In each of the Army Specialized Training programs in civil, mechanical, electrical, and chemical engineering, the Electrical Engineering Department has given instruction, and it has been responsible for the major portion of the A.S.T. Program in electrical engineering.

One subject in the Electrical Engineering Course deals with servomechanisms and control devices, and has been given at graduate level for the past four years. In order to assist other engineering schools in giving this subject for the Army Specialized Training Program, the Institute group, assisted by representatives from three industries particularly interested in this subject, held a co-operative conference with teachers from 50 universities. As a result, a recommended syllabus and laboratory program was prepared and is the basis of instruction at all universities. It is a tribute to the Institute that in this, as in other subjects mentioned in previous Committee reports, the staff of this Department have been instrumental in developing, for the training of personnel for the armed services, apparatus and teaching methods which have been made available to other universities.

The expanding use of electrical methods and devices in other engineering fields has shown the necessity of developing an integrated program in electrical engineering fundamentals for students in Civil and Mechanical Engineering. This program has three broad objectives: (1) thoroughness in fundamental training; (2) comprehensive treatment of electronics, measurements, and electrical machinery; (3) close co-ordination of classroom and laboratory work.

After a lengthy discussion, the Committee felt that an investigation should be made as to the feasibility of modernizing, to the extent found practicable, the general teaching methods not only in this but in other Departments of the Institute. The use of pictures (both movies and stills), supplemented by prepared talks on film and record, was discussed. There are decided limitations to such methods at the Institute; it is not expected that they would replace the fundamental thinking of the student. They would, however, be of use in portraying the reaction and interreaction of mechanisms and control methods, and in supplementing textbook illustrations.

A further reason for the recommended investigation is the problem which the Institute will have in the teaching of returned servicemen who have lost their earlier learning habits. Such a presentation, it is felt, will be very valuable. It is not clear what limitations may be prescribed by the government in educational courses for discharged military personnel, but the Committee urge that a serious effort be made to include training in the humanities.

The research efforts of the Department have been almost exclusively confined to problems connected with the war effort. From this work, long-range benefits of great importance are indicated. Material assistance in it is given by graduate and undergraduate students.

(*Concluded on page 514*)

KEEPING UP WITH *Electricity*

BACK ON THE JOB after a 25-year layoff are the original Westinghouse generators at Niagara Falls. These went into service in 1895 as part of the first great a-c polyphase power system. Replaced in 1917, they were kept as standby equipment until the beginning of the present war. Rewound and reconditioned, they are now back in full-time service, delivering *more* power than when new.

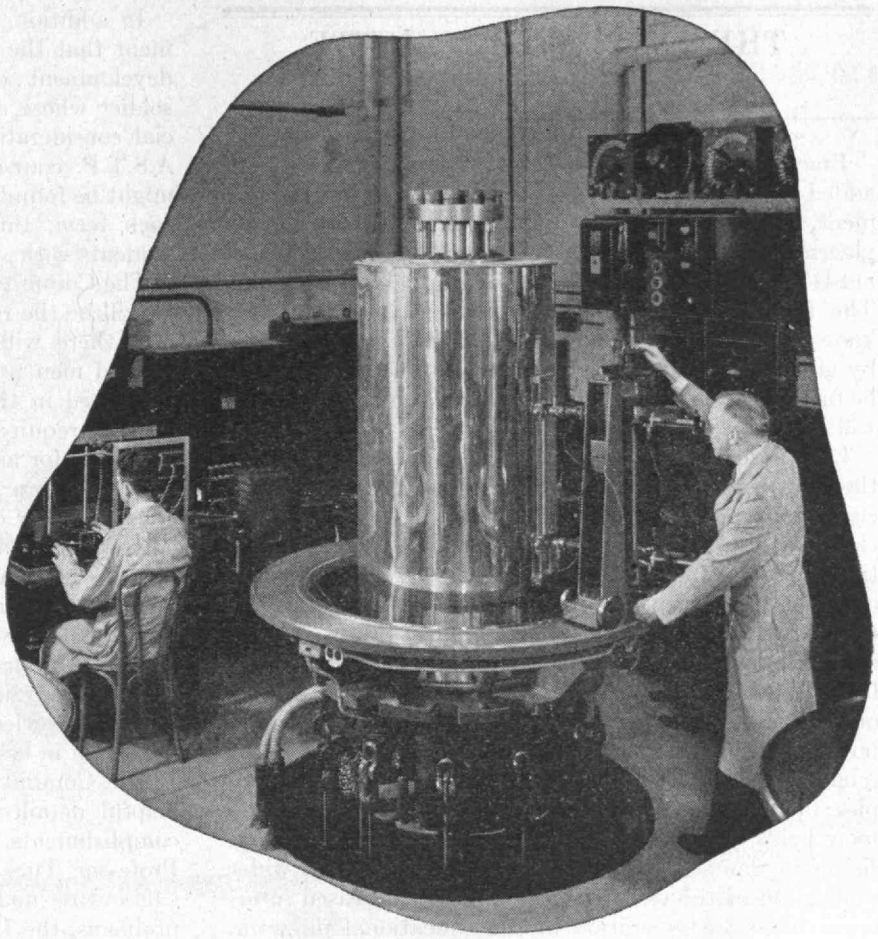
LIGHTS FOR HEAVYWEIGHTS. Those new super-bombers we've been reading about brought trouble on landing fields. Contact lights, sunk in the concrete runways, weren't built to stand the weight, so structural strength had to be increased to 200,000 pounds, without any change in dimensions. As late as 1942, 35,000 pounds was standard.

SIX-ROOM TRANSFORMERS—rather transformers as large as a six-room house are now serving a new war industry. They're rated at 75,000 kva each, and require 188 tons of steel, 130 miles of copper wire. Separately-mounted radiators, and use of Hipersil for cores kept down size and weight. Otherwise, say engineers, problems of shipment and installation would have been insuperable.

ELECTRONS BY THE POUND. One of the slide rule boys has figured out that nearly 4 pounds of electrons pass through each of the d-c terminals of a 10,000 ampere Ignitron rectifier in the course of one year. That's about 2,000,000,000,000,000,000,000,000,000,000,000 electrons, they tell us.

"MAKE WAY FOR A SAILOR" may be the new slogan in locomotives. Steam turbines, so efficient in ship propulsion, are being adapted for railroad use. Tests of one Westinghouse experimental 6,500 hp unit indicate a saving of one-fourth in steam required, compared to conventional reciprocating engines of the same power.

INSPECTING THE INVISIBLE. Tiny pinholes, invisible to the naked eye, mean defective tin plate and possible spoilage of badly needed food. A Westinghouse photoelectric device detects these defects every time, though the tin plate rolls past at 1,000 feet a minute. Flawed sections are automatically marked, to be later cut and removed.



Research behind gas turbines

The known simplicity and theoretical efficiency of the gas turbine has challenged generations of engineers. But the gas turbine as a *practical producer of power* could not exist until new alloys were created—alloys which could withstand high temperatures for long periods.

In the testing machine shown here, Westinghouse scientists tested alloys, subjecting them to stresses of thousands of pounds per square inch at temperatures as high as 1,000 degrees Fahrenheit. This was the research that provided better materials for steam turbines.

It was also an important step toward gas turbines. As the work continued, with new alloys and new testing machines, positive results were obtained at the high temperatures required for efficient gas turbine operation. *Thus, research developed the materials which make the gas turbine a practical possibility.*

Another example of the Westinghouse research that is constantly providing new tools for industry. Westinghouse Electric & Manufacturing Co., Pittsburgh 30, Pennsylvania.

WESTINGHOUSE PRESENTS: *John Charles Thomas, Sun. 2:30 p.m., EWT, NBC. "Top of the Evening," Mon. Wed. Fri. 10:15 p.m., EWT, Blue Network.*

Westinghouse

PLANTS IN 25 CITIES OFFICES EVERYWHERE

THE INSTITUTE GAZETTE

(*Concluded from page 512*)

Practically no new laboratory equipment has been added during this period to the facilities of the Department, and there has been difficulty with repairs and replacements. The Committee gave consideration to future needs and suggested that a thorough analysis be made. The feeling was that if the required apparatus were known in advance, advantage could be taken to obtain by gift or at a nominal cost such equipment as will not be further needed by industry and government but which will be useful in our laboratories.

Like industry, educational institutions must develop their postwar plans. The Department has focused its consideration upon these elements: (1) more emphasis on electronics and electronic applications in the communications and noncommunications fields; (2) greater emphasis on materials for which a scientific basis of analysis, synthesis, and practical applications is emerging; (3) a shifting of emphasis in electromagnetic and particularly ferroelectromagnetic apparatus toward a more general outlook as contrasted with primary concentration on power-system machinery; (4) more emphasis on "systems" as a synthesis and correlation of elementary principles; (5) a broadened base of co-operative work to include more fields, companies, and students; (6) greater emphasis on fundamental mathematics and physics; (7) wider unification of the research program; (8) increased interdepartmental co-operation in the educational program.

In addition, the Committee agreed with the Department that the following points must be considered: (a) development of methods of educating the returned soldier whose education was interrupted, including special consideration of those who have taken part of the A.S.T.P. course; (b) simplification of the curricula, as might be found practicable, so that they may be given in each term, thus assisting in meeting the schedule of students with varying needs.

The Committee feel that the problem after World War II will be the reverse of that after World War I, in that now there will be more craftsmen and fewer college-trained men to be given consideration. The Committee concurred in the Department's recommendation that a postwar requirement would be space adjacent to the Department for an electrical engineering reading room and reference library with one or more librarians in attendance. Postwar demands upon the Department undoubtedly will include requests for training in the new techniques — for example, applications of microwaves, which are so prominent in the war program. The Committee felt, however, that the emphasis must continue to be on the fundamentals and that the student should be so thoroughly trained that he might apply this basic training and knowledge to the varied problems that will confront him in later life.

The Committee wish to express appreciation for the helpful detailed presentation of the Department's accomplishments, problems, and aims, which was made by Professor Tucker, '18, and Professor Hazen, '24. The Committee unanimously feel that in spite of the war problems, the Department has been functioning well.

THE TREND OF AFFAIRS

(Continued from page 482)

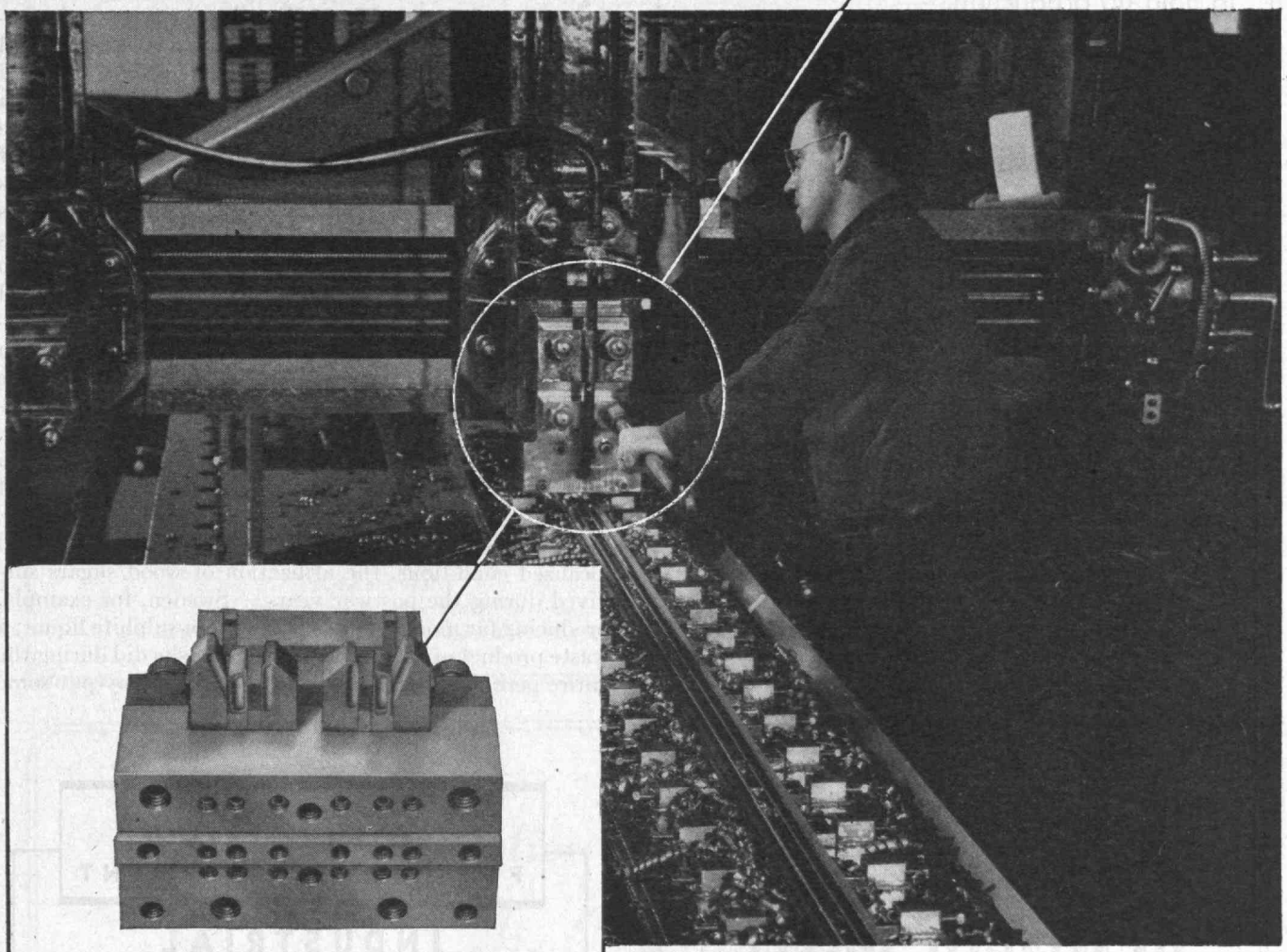
of marked value in disabusing the rocket idea of a good many of the false notions too often surrounding it.

The historical content of the volume is of two sorts, each detailed and each interesting. In the first part, Mr. Ley surveys both the ideas of space and space travel and the history of rockets and rocket propulsion. The résumé is written in direct order, clearly and vividly. In the second part, he gives a circumstantial account of the period of energetic developmental activity which engrossed European devotees of rocketry in the decade beginning about 1926 and in which the Verein für Raumschiffahrt (or the VfR) — known in English as the German Rocket Society — played the leading role. Himself one of the group who founded the society and a familiar of the central figures in the drama, from the moody and perspicacious Hermann Oberth to the impulsive and ill-fated Max Valier — Mr. Ley is well qualified to give this story all the verve and fascination which it rightly possesses. The narrative skill with which readers of his articles in recent Reviews are familiar stands him in good stead in recreating something of the mood of experimentation, expectation, and untrammeled zest which marked the activities of the society before the advent of Hitler doomed it.

Apart from these narratives, probably the most immediately valuable section of the volume is that devoted to a discussion of the possibilities of modern rockets as means of meteorological research and service. Describing present methods of sounding the upper atmosphere to secure meteorological data, Mr. Ley defines a hypothetical problem and describes in considerable detail the theory and construction of an instrument-carrying rocket designed to meet it. Such a device, he holds, could attain an altitude of 85,300 feet if launched from sea level. Its drift, because of the rapidity of its ascent, would be far less than that to which present-day meteorological balloons are subject. The parachute drift of the device as it descends would be smaller, too, because of the greater weight coming down, and the instruments would be less apt to suffer damage in landing, because the rocket itself would touch ground first, relieving the parachute of its weight. Such a rocket, he argues, can be realized soon. It would be about 10 feet long, powered probably with oxygen and alcohol or gasoline — the rocket motor, or combustion device, being mounted at the top of the assembly, dragging the rest along through space.

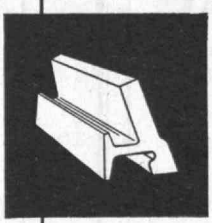
(Conitnued on page 518)

From many milling cuts on each one-inch piece to one planer cut on each ten-foot bar



. . . here's how TAFT-PEIRCE CONTRACT SERVICE simplified production of this Gun Part

Above is the double tool set-up, on the planer which cuts all angles, faces, and slots on two ten-foot steel bars *in one operation*. Bars are then cut into one-inch sections, each of which is a completed recoil plate, as at the right.



Production of this recoil plate was formerly done by taking many milling cuts on each one-inch piece. Then Taft-Peirce Contract Service engineers applied some original thinking to the problem . . . transferred the job to a planer, devised a multiple tool set-up that finished two ten-foot bars in one operation, *multiplied production a hundred times over.*

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THE TREND OF AFFAIRS

(*Continued from page 516*)

Evergreen Pastures

NOT the least astonishing feat of chemistry that marked the last World War was the large-scale production of edible sugars and alcohol from wood. Time and an abundance of other industrial miracles have diverted attention from the processes by which man can utilize a vegetable substance which nature never intended for the nourishment of yeasts, let alone for the nourishment of man and his domestic animals. But although a cow's series of stomachs are no match for a termite's, Sweden is currently producing from wood wastes over 300,000 tons of cattle fodder a year — fodder which, though not so cheap or so complete a food as grain or hay, has saved many thousands of Swedish cattle. Germany is undoubtedly also producing large amounts of edible sugars from this source, and both countries, as well as Canada, are producing alcohol by the millions of gallons from pulp-mill wastes.

A quarter of a century ago the process was purely a wartime phenomenon, feasible only under the stress of blockade and swollen demand. For one reason or another, most of them tied up with government policy or special localized conditions, the utilization of wood sugars survived during the postwar years — Sweden, for example, producing far more alcohol in 1930 from sulphite liquor, a waste product of paper pulp mills, than she did during the entire period of the first World War. Germany put some

(*Continued on page 520*)

THE TREND OF AFFAIRS

(*Continued from page 518*)

of her most competent industrial chemists on the problem, among them Friedrich Bergius, famous for his work on the fixation of atmospheric nitrogen and the hydrogenation of coal into liquid fuels. In 1936, Germany's reported capacity for converting wood into alcohol by two of the many known processes was in the order of 3,000,000 gallons of alcohol a year. That's not much. The United States will require an estimated 632,000,000 gallons of industrial alcohol in 1944, more than half of it going into the synthetic rubber program. It has been estimated, however, that about a quarter of our total alcohol requirements could be obtained from wood wastes.

That sugar and ethyl alcohol can come from a tree is due to the fact that nature, for all her infinite variety, frequently shows on more careful scrutiny a strong tendency toward variations on standard themes. One of her favorite themes is glucose. This simple sugar molecule can be found, repeated many times, in starch and in the various cellulose molecules. By more or less rigorous treatment, depending on just how strongly the molecule is tied together, starch and cellulose can be broken down into the original sugars from which they were built up. Breaking up starch into dextrin and glucose is an easy matter and is carried out commercially on an enormous scale. Breaking up the large tough molecules of cellulose into sugars, although it was first done experimentally in 1819 and on a commercial scale in 1910 (in South Carolina, by the way), is a complicated job involving the use of large amounts of mineral acids and steam. The acids, furthermore, are just as willing to digest the equipment as the wood, and the apparatus makes use of large quantities of critical materials, one of the reasons why wood sugars are not being more extensively employed to relieve our alcohol shortage.

In the Bergius process, which converts almost two-thirds of the dry wood into sugars, concentrated hydrochloric acid is used to dissolve the wood (except for the lignin). Then follow the recovery of the acid, separation of the lignin, neutralization of the sugar solution, and preparation of it so that it can be readily fermented. Wood sugars obtained by any process require the addition of phosphorus- and nitrogen-bearing nutrients if they are to be fermented with maximum effectiveness, and sometimes the removal of toxic substances. Even so, about one-third of the sugars cannot be turned into alcohol but can be eaten by animals.

(*Concluded on page 522*)

THE TREND OF AFFAIRS

(*Concluded from page 520*)

In the widely used Scholler process, which turns about half the dry weight of wood into sugar, the wood chips are hydrolyzed with a dilute solution of sulphuric acid under steam pressures of from 50 to 150 pounds per square inch. Again, the lignin is left undissolved — a by-product which, in pilot-plant tests by the Forest Products Laboratory of the United States Department of Agriculture, is sent back to the boilers as fuel. Were any sort of a market found for this lignin, the economics of the process would be immensely improved, for sale of it at one cent a pound would reduce the cost of the alcohol by about ten cents a gallon. The present government price for alcohol is 50 cents a gallon, but industrial alcohol can be produced at a far lower level during normal times. That, in fact, is the real joker in the various methods of breaking wood down into its constituent sugars. The sugars can be produced more cheaply and directly by a variety of other plants, mainly sugar cane and the sugar beet. Molasses from these two sources or waste gases from oil refineries are normally the major sources of industrial alcohol in this country. For countries which do not find these materials so accessible as does the United States, or which desire domestic sources, or which, in the future, find good uses for lignin, a different picture results.

A much better looking balance sheet can be drawn up for the making of alcohol from sulphite liquor. Almost half the wood is thrown away in the making of chemical pulp, and because of the rigorous treatment the molecules receive, many of them are already broken up into sugars by the time they are discharged as waste. In Sweden, 12,000,000 gallons of alcohol a year are made from this source.

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TECHNOLOGY MEN IN ACTION

THE ALUMNI FUND — ITS PROBLEMS AND GROWTH

ARE YOU ONE OF THE 3,500?

AS this is written over 3,500 Alumni have already contributed to our annual Fund in this, its fifth year. More than a third of our goal of 10,000 men has been reached in less than a month and a half. Are you one of that number?

YOU *were* one of the more than 8,800 contributors last year. Your support meant much to the Institute. It helped to give us our most successful year so far, and it was truly appreciated.

THIS year to date one of every eight is a "new" contributor, an Alumnus who did not join with us last year. If this rate continues, and if you and those others who gave in 1943–44 again demonstrate your willingness to aid Technology through this annual program of giving, we will reach that 10,000 goal!

If you have already contributed this year, thanks! If not, won't you join with us again? Technology needs your help!

TECHNOLOGY MEN IN ACTION

M.I.T. MEN AT WAR

Up to May 11 over 5,600 Institute Alumni, including 25 Admirals, 1 Commodore, and 69 Generals, were recorded as being in the active naval or military services of the United Nations. The new addition this month is Rear Adm. Forrest B. Royal '24. There were 65 Alumni who had already been decorated.

Additions and corrections to the listings which have previously appeared, beginning with the issue of November, 1942, will continue to be published in future issues of The Review. As a matter of convenience, promotions and corrections in the rank previously given are grouped under a single heading, "Changes in Rank." The Review Editors are greatly indebted to the many Alumni and other readers who are continuing to co-operate so helpfully in reporting inevitable errors of omission and commission which they note in these listings.

NEW DECORATIONS

1921 Moses, Raymond G., *Brig Gen.*, U.S.A., Distinguished Service Medal — No details.
Scott, Stanley L., *Brig. Gen.*, U.S.A., Order of Kutuzov, Second Class (Russian).
Shingler, Don G., *Brig. Gen.*, U.S.A., Order of Kutuzov, Second Class (Russian).
1922 Beatty, Frank E., *Capt.*, U.S.N., Navy Cross — No details.
1926 Mattson, Robert E., *Lt. Col.*, U.S.A., Order of the Fatherland's War First Class (Russian).
1930 Bisson, Reginald A., *Maj.*, U.S.A., Legion of Merit — "For exceptionally meritorious conduct in the performance of outstanding service in the Levant. . . ."
1937 Laus, Andre N., *Capt.*, U.S.A., Silver Star — "For gallantry in action in Sicily."
1939 Pope, Gordon A., *Maj.*, U.S.A., Purple Heart, Two Oak Leaf Clusters, Military Cross (British) — No details.
1942 Weingarten, John, *Lt.*, U.S.A., Air Medal, Two Oak Leaf Clusters — No details.
1943 Robinson, Gwynn H., *Capt.*, U.S.A., Distinguished Flying Cross, Air Medal with cluster, Purple Heart — "He won the Distinguished Flying Cross for extraordinary achievement while participating in aerial flight in the North African theater. . . ."

NEW COMMENDATION

1937 Swan, Harry C., *Lt. Col.*. *U.S.A.* Received commendation from the commander of his field, Col. Edward W. Anderson, for the excellence of the job he had performed. The Colonel stated that he "desires to commend you and your staff for the loyal and efficient manner in which they have assumed and performed their duties since coming to this station. Carry on."

NEW LISTINGS

U.S.A.

1915 Waldron, Edward F., *Capt.*
1917 Doon, James W., *Maj.*
Wettlaufer, Julius L., *Lt. Col.*
1922 Ronneberg, Conrad E., *Maj.*
1923 Appleton, William E., *Lt. Col.*
Schweizer, Albert C., *Capt.*
1924 Stevens, Albert W., *Capt.*
1926 Sano, Machteld E., *Capt.*
Van Buren, Francis R., *Capt.*
1929 Bornstein, Aaron, *Lt.*
Campbell, Charles A., *Capt.*
Mackay, Reginald, *Maj.*
Richardson, Donald W., *Sgt.*
1931 Burtner, O. Whitmore, *1st Lt.*
1932 Zampell, Roger J., *Maj.*
1934 Martin, Gillette K., *Pvt.*
Stackpole, Theodore B.
1938 Brown, Russell H., *Sgt.*
1942 Weingarten, John, *Lt.*
1943 Cain, William J., *2nd Lt.*
Lynn, Robert J., *2nd Lt.*
Smith, G. H. Miller, *2nd Lt.*

U.S.N.

1919 Thomas, W. Pratt, *Comdr.*
1927 Brown, Russell H., *C.M.3c.*
1929 Trahey, John C., *Lt. (j.g.)*
1930 Hawkins, Edgar M., Jr., *Lt.*
Karsh, George, *S.2c.*
1931 Sibley, Otis A., *Lt. Comdr.*
1932 Nisle, Robert G., *Ens.*
1934 Dean, Frank J., *Lt.*
Richards, Frank G., *Lt. (j.g.)*
1935 Dubbs, Carbon C., *Lt. (j.g.)*
Warren, Kenneth M., *Lt. (j.g.)*
Whitney, John R., *Lt. (j.g.)*
1936 Young, Clinton J. T., *Lt.*
1937 Clark, Joe S., *E.M.2c.*
Hansford, VanBuren N., *Lt. (j.g.)*
1938 Kaufman, Solomon, *Lt. (j.g.)*
Ness, Howard C., *Ens.*
Worthen, Welles, *Ens.*
1939 Robinson, Knight D., *Ens.*
1940 Brady, Philip G., *Cadet*
Hunsaker, James P., *Ens.*
Kapinos, John, *S.1c.*
Robinson, Richard G., *Ens.*
Snyder, R. Robert, *R.T.3c.*
1941 Dewey, Davis R., 2d, *Lt. (j.g.)*
Gillies, Donald B., Jr., *Lt.*
Willey, Walter D., *Lt.*
1942 Kram, Harvey I., *Ens.*
1943 Adler, Richard B., *Ens.*
Allardt, Frederick E., *Ens.*
Markkanen, Carlo O., *S.1c.*
Turnbull, John G., *Ens.*

U.S.M.C.

1941 Bone, John E., *Corp.*

CHINA

Army

1913 Loo, Wai Gyiao, *Col.*
1921 Lo, Jung-An, *Col.*

GREAT BRITAIN

Army

1933 Swirsky, Chaim, *Capt.*

CHANGES IN RANK

U.S.A.

1910 Bell, Frank F., *Lt. Col.* to *Col.*
Lovejoy, Carl H., *Maj.* to *Lt. Col.*
1918 Braaten, Ingvald, *Capt.* to *Maj.*
1921 Nelles, Philip A., Jr., *Capt.* to *Maj.*
Winn, John J., *Maj.* to *Lt. Col.*
1922 Erikson, Alden F., *Maj.* to *Lt. Col.*
1924 Correale, William H., *Capt.* to *Maj.*
1925 De Kay, John W., Jr., *Sgt.* to *S.Sgt.*
Eager, Edward W., Jr., *Lt.* to *Capt.*
1926 Thomas, Cecil A. P., *Capt.* to *Maj.*
1928 Cunningham, James C., *Maj.* to *Lt. Col.*
1929 Alexieff, Theodore S., *Capt.* to *Maj.*
1933 Lebeau, Lawrence C., *Pvt.* to *S.Sgt.*
1934 Cross, Franklin V., *Lt.* to *Capt.*
1935 Leavitt, S. Trowbridge, *M.Sgt.* to *Lt.*
Shaw, Richard L., *Capt.* to *Maj.*
Smith, Phillips W., *Lt. Col.* to *Col.*
1936 Boulware, Ford M., *Capt.* to *Maj.*
Gray, Charles H., *Corp.* to *T.4c.*
Grossman, Eli A., *A.C.*, to *2nd Lt.*
Tower, G. Nelson, Jr., *Pvt.* to *1st Lt.*
1937 Agnew, James C., Jr., *Capt.* to *Maj.*
Dodge, Cleon C., *Capt.* to *Maj.*
Laus, Andre N., *1st Lt.* to *Capt.*
Swan, Harry C., *Maj.* to *Lt. Col.*
Yurkanis, Paul J., *Lt.* to *Maj.*
1938 Boland, Frederick E., *Capt.* to *Maj.*
Bruneau, Armand L., Jr., *Pvt.* to *Corp.*
Buffington, Francis S., *1st Lt.* to *Capt.*
Foss, Paul B., *Corp.* to *Sgt.*
Mayer, Ivan, *Lt.* to *Capt.*
1939 Brown, Walter N., Jr., *Capt.* to *Maj.*
Constance, Philip W., *Capt.* to *Maj.*
Heacock, Roy C., *Lt.* to *Maj.*
1940 Ackerson, Alfred N., *2nd Lt.* to *1st Lt.*
Cole, Donald M., Jr., *Capt.* to *Maj.*
Hollomon, J. Herbert, *1st Lt.* to *Capt.*
Orpen, J. Harry, *Capt.* to *Maj.*
Park, Peter G., *1st Lt.* to *Capt.*
1941 Hooper, William K., *Lt.* to *Capt.*
King, Charles H., Jr., *Lt.* to *Capt.*
Turnock, Lawrence C., Jr., *2nd Lt.* to *Capt.*
1942 Howell, Albert C., *2nd Lt.* to *Capt.*
Olsen, Fredrich H., *Cadet* to *2nd Lt.*
Todd, Edward P., *Lt.* to *Capt.*
1943 Courshon, Jacob B., Jr., *Cadet* to *Lt.*
Peacock, Andrew C., *A.C.* to *Lt.*
Robinson, Gwynn H., *Lt.* to *Capt.*
Stephens, Marvin C., *A.C.* to *2nd Lt.*

U.S.N.

1921 Schumacher, Theodore L., *Comdr.* to *Capt.*
1922 Hindes, Barrett G., *Lt. Comdr.* to *Capt.*
1923 Maxson, Lisle J., *Comdr.* to *Capt.*
1924 Royal, Forrest B., *Capt.* to *Rear Adm.*
1925 Halliburton, Virgil F., *Lt.* to *Lt. Comdr.*
Lynch, J. Merriman, *Lt. Comdr.* to *Comdr.*
1932 Dunning, Albert W., *Lt.* to *Lt. Comdr.*
1933 Shea, Robert E., *Ens.* to *Lt.*
1934 Goodwin, Philip M., *Lt.* to *Lt. Comdr.*
1935 Lindenmeyr, Robert E., Jr., *Lt.* to *Lt. Comdr.*
Meakin, John B., *Lt.* to *Lt. Comdr.*
1937 Mott, Gilbert C., *Ens.* to *Lt. (j.g.)*
1939 Hoffman, Charles H., *Ens.* to *Lt. (j.g.)*
1941 Ballinger, John M., *Lt.* to *Lt. Comdr.*
Moffet, Clifford E., *Ens.* to *Lt. (j.g.)*
1942 Stempf, Charles R., *Ens.* to *Lt. (j.g.)*
1943 Billings, Guy, *Ens.* to *Lt. (j.g.)*
Davis, Wendell, *Ens.* to *Lt. (j.g.)*
Greenewald, Herbert, Jr., *Mid.* to *Ens.*
Hirschberger, Carl R., *Lt.* to *Lt. Comdr.*
Spears, Morton F., *Ens.* to *Lt. (j.g.)*

U.S.C.G.

1941 Eve, Edward A., Jr., *Lt.* to *Comdr.*

U.S.M.C.

1938 Crocker, Frederick P., *2nd Lt.* to *1st Lt.*

M.I.T. COMMANDS

Major General Fulton Q. C. Gardner '13, who formerly commanded the antiaircraft defenses of the Pacific Coast, has been appointed Commanding General of the Northeastern Sector, Eastern Defense Command, effective as of May 15.

General Gardner succeeds Major General Kenneth T. Blood '09, commander of New England's harbor defenses since May, 1942, who has been transferred to another important assignment in the War Department. General Blood was appointed commander of the Harbor Defenses of Boston in April, 1941, and one year later became the Commanding General of the Southern Sector, Eastern Defense Command. He returned to New England in May, 1942, and assumed command of the New England Sector. General Blood was promoted to the rank of major general the following September. On March 1 of this year, when the Army's defenses along the Atlantic Coast were reorganized, General Blood became the Commanding General of the Northeastern Sector, Eastern Defense Command.

RANK NOT PREVIOUSLY PUBLISHED

1942 Granitsas, George A., *1st Lt.* U.S.A.

CASUALTIES

1936 *Gates, Clayton S., *Lt. Col.*, U.S.A. Died from accident at Camp Pickett, Va.
1940 ‡Bernd, Peter P., *Capt.*, U.S.A. Japan. (Previously reported missing in action.)
†Kaplan, Milton J., *2nd Lt.*, U.S.A. European theater.
1941 ★Nagle, John J., 3d, *Capt.*, U.S.A. New Guinea

★ Killed in Action †Missing in Action ‡Prisoner of War *Died in Service **Wounded

ALUMNI AND OFFICERS IN THE NEWS

Architectural

¶ Home for the embassy of the United States in war-torn Chungking is to be in two new buildings, welcome change from the random "boarding around" which the representatives of our State Department have had to do. SUNG-SING KWAN '19, designer of the new establishment, has provided a peak-shaped portico and four tall columns for one of the buildings. Built of the bamboo laths and mud plaster which are Chungking's chief building materials for the duration, the structures will be painted battleship gray.

¶ Active in a project for the provision of small, inexpensive, but attractive church buildings for 10 Catholic parishes in Missouri is DOM HILARY MARTIN '30. The British landscape painter, Charlton Fortune, brought Dom Hilary into the undertaking, which has the vigorous support of Bishop Edwin V. O'Hara of the Kansas City diocese.

¶ That cities need not be ugly and that a sound three-dimensional approach to the problem of planning can prevent their being so were stressed by WILLIAM EMERSON, staff emeritus, in an urban development lecture at Cincinnati March 28, under the auspices of the University of Cincinnati. Dean Emerson was introduced by FREDERICK W. GARBER '03.

Office

¶ For ARTHUR W. LUNN '09, membership on the board of managers of the Franklin Savings Institution of Newark.

¶ For SAMUEL M. ELLSWORTH '16, presidency of the Boston Society of Civil Engineers and for CARROLL A. FARWELL '06, vice-presidency of the same society.

¶ For ALAN E. CAMERON '26, deputy minister of mines for Nova Scotia, the chairmanship of the Halifax branch of the Canadian Institute of Mining and Metallurgy, and for R. MASSEY WILLIAMS '27, the chairmanship of the Kirkland district branch.

¶ For EDWARD MCL. TITTMANN '29, chairmanship of the Montana section, American Institute of Mining and Metallurgical Engineers.

¶ For GEORGE R. HARRISON, staff, vice-presidency of the American Academy of Arts and Sciences, and for HUDSON HOAGLAND '24 and HORACE S. FORD, staff, the recording secretaryship and treasurership respectively.

Tomes

¶ By EMORY S. LAND '07, the introduction, and by PHILIP L. RHODES '19, and HOWARD L. VICKERY '21, chapters, in *Merchant Fleets*, Dodd, Mead and Company.

¶ By TENNEY L. DAVIS '13, former staff, *The Chemistry of Powder and Explosives*, Volume 2, John Wiley and Sons, Inc.

¶ By ALBERT B. DEYARMOND '30, with Albert Arslan, *Fundamentals of Stress Analysis*, Aero Publishers.

¶ By ERNEST J. A. GREENWOOD, JR., '34, with J. R. Silverman, *Stress Analysis for Airplane Draftsmen*, McGraw-Hill Book Company.

¶ By CHARLES M. PARKER '34, *Steel in Action*, Jaques Cattell Press.

¶ By ROWLAND B. VANCE '45, *They Made Me a Leatherneck*, W. W. Norton and Company, Inc.

Pronouncements

¶ By LAMMOT DU PONT '01, before the American Section of the Society of Chemical Industry on March 31, an address in commemoration of Lavoisier.

¶ By WARREN K. LEWIS '05, before a public affairs forum sponsored by the Y.M.C.A. in Baltimore on March 29, on the prospects for industry of the immediate future and of the years after the war.

¶ By WILLIAM H. SMITH '15, captain in the Navy, before the Cincinnati Rotary Club on April 20, on the Navy's Construction Battalions, or Seabees.

¶ By HOYT C. HOTTEL '24, at the 46th annual meeting of the American Ceramic Society in Pittsburgh on April 2, on infrared heating. Professor Hottel delivered the Edward Orton, Jr., fellow lecture.

¶ By ROLAND F. BEERS '28, before the American Association of Petroleum Geologists at Dallas on March 21, on "Radioactivity and Organic Content of Some Paleozoic Shales." On the same day Dr. Beers shared in conducting a technical session of the Society of Exploration Geophysicists and CHARLES W. SHEPPARD, staff, discussed radioactivity studies before the American Association of Petroleum Geologists.

¶ By MARY CARR BAKER '40, before the Quota Club of Boston on April 6, on "Grooming for the Job."

¶ By FRANCIS M. CURRIER, staff, before the Rhode Island group of the New England Modern Language Association at Brown University on May 20, on "The Lighter Side of Literary Research." As president of the association, Professor Currier presided at sessions of its 41st annual meeting in Boston on May 12 and 13. ERNEST F. LANGLEY, staff, presided as chairman of the French section.

DEATHS

** Mentioned in class notes.*

¶ WILLIAM H. BUSH '75, March 24.*
¶ CHARLES A. CLARKE '77, April 27.*
¶ FRANCIS C. HOLMAN '77, January 16.*
¶ CALVIN W. MCFERRAN '85, March 12.
¶ WILLIAM B. BLAKE '87, April 6.*
¶ EDWIN R. PEARSON '88, January 28.*
¶ GEORGE A. ORROK '89, April 6.*
¶ ELTON D. WALKER '90, February 24.
¶ ARTHUR H. ALLEY '91, April 21.*
¶ JOHN PUTNAM '91, April 14.*
¶ ARTHUR C. SMITH '91, August 7.*
¶ FRANCIS S. VIELE '91, April 10.*
¶ LOUIS C. MARBLE '96, May 7.
¶ W. HARRISON THOMAS, JR., '96, March 31.
¶ ALBERT E. KIMBERLY '97, April 21.*
¶ JOHN BROWN '00, March 19.*
¶ WILLARD W. STONE '00, February 11.*
¶ ROY H. BOLSTER '01, September 8.*
¶ JOHN R. BROWNELL '01, July 27.*
¶ JOHN W. J. CALNAN '03, March 9.*
¶ VIRGIL M. PALMER '03, February 16.*
¶ JULES V. BARND, 3D, '05, January 15.*
¶ ALBERT W. WALKER '05, June 15, 1943.*
¶ MORRIS H. WHITEHOUSE '05, April 4.*
¶ EUGENE P. CHASE '06, October 16.
¶ FREDERICK E. MACMILLAN '06, September 8.
¶ PAUL F. MANN '06, February 7, 1943.
¶ ROBERT L. DODGE '10, April 4.*
¶ LEWIS W. WATERS '10, March 31.*
¶ THEODORE B. PARKER '11, April 27.*
¶ CLAYTON S. ROBINSON '11, March 10.*
¶ WILLIAM DEYOUNG KAY '13, January 31.*
¶ JOHN S. WILLIAMS, 3D, '15, January 29.*
¶ GEORGE M. MACHECA '18, July 25.*
¶ EARLE R. PICKETT '18, November.*
¶ JOHN T. WHITMORE '18, December 14.*
¶ ROBERT F. MORRISON '19, October 16.*
¶ YSSEL Y. YOUNG '21, April 2.*
¶ HAROLD J. ACTON '23, January 29.*
¶ LEONARD L. ELLIS '30, January 30.
¶ HAROLD M. REED '42, February 16.*
¶ THOMAS E. MCGRATH '43, January 29.*

NEWS FROM THE CLUBS AND CLASSES

CLUB NOTES

Technology Club of Chicago

Lonsdale Green '87, club historian, submits the following account: The Technology Club of Chicago held its annual dinner in honor of Dr. Compton at the Hotel Sherman on March 28. A fine turnout of 200 Alumni insured a successful evening. The festivities got under way at 6:15 P.M. with a reception for Dr. Compton in the palatial House on the Roof atop the Sherman. There, with the mellowing influences of strolling musicians and an attractive log fire, to say nothing of the smooth cocktails, a real atmosphere of good fellowship soon prevailed. The members were thus given an opportunity to greet Dr. Compton personally and have a chat, as well as to renew friendships with classmates and others — an opportunity occurring far too infrequently in these busy times.

At 7:15 P.M. the assembly adjourned to the Bal Tabarin Room and after singing the national anthem, sat down to a fine dinner which proved that Erny Byfield, managing director of the Sherman, had taken personal interest in our welfare. Those sitting at the speakers' table were: Dr. Compton; Harold B. Harvey '05, President of the Club; James M. Barker '07, life member of the Corporation; Philip W. Moore '01 and E. P. Brooks '17, term members of the Corporation; Herbert S. Philbrick '06, Professor Emeritus of Mechanical Engineering, Northwestern University Technological Institute; L. H. G. Bouscaren '04 and John M. Frank '07, past Presidents of the Club; our ever young and always present veterans, Lonsdale Green and Richard Schmidt, both of the Class of '87; Thomas Russell '27, director; Philip J. McGoohan '35, a major in the Army Ordnance; Leo C. McEvoy, Jr., '38, a captain in the Army Ordnance; Edmund G. Farrand '21, Secretary of the Club, and Sherry O'Brien '17, Chairman of the Council. Members were seated at tables by classes; and since medals are being bestowed these days, we must in all fairness award the attendance medal to the Class of 1918, of which twelve members were present. 1917 had the pleasure of welcoming John DeBell and Leon McGrady, who happened to be in Chicago and to hear of the meeting in time to attend.

Immediately following the dinner, the guests enjoyed a five-act show, the talent all being of big-time quality. Club President Pete Harvey '05, then took over as toastmaster and after setting May 23 as the date of a luncheon meeting for the election of officers and directors, introduced our guest of honor and principal speaker, President Compton, who was promptly given a great welcome and a regular Technology cheer. We then settled down for the main event of the evening, and Dr. Compton gave us his usual fine talk. Without crossing censorship lines, he told us some of the impressions left on him during his recent journey to the southwest Pacific. This whetted our appetite, of course, and we were sorry that duty prevented him from opening up. He then brought us up to date concerning the affairs of the Institute. He particularly stressed the many operational difficulties due to constantly changing conditions, as well as the serious problems yet to be faced and solved before the Institute would be functioning once again on a peacetime basis with a full complement of classes. These problems, he said, concern not only finances but the need of alertness and the vision required to maintain the Institute in a commanding position of leadership from the standpoint of the curriculum, because of the rapid development of things scientific and technological. Dr. Compton concluded his remarks by complimenting the Alumni as a whole on the upward trend of the Alumni Fund and stressing its importance as annual income inasmuch as the times are hardly conducive to large bequests.

The climax of a great evening occurred when Sherry O'Brien '17 presented Dr. Compton with a check for $5,000.00, the personal gift of Pete Harvey '05. Sherry, in a few well-chosen remarks, told how in his capacity of honorary secretary he had come to realize the need of more than one regional scholarship for the Chicago area, so that aid could be given to outstanding applicants. He had discussed this matter with Pete Harvey, who immediately and generously responded. The gift is to be used as a wasting fund to grant scholarships to applicants from the Chicago area, said grants to be known as the Technology Club of Chicago Scholarships, and to be awarded by the honorary secretaries of the Chicago district and the dean of students or his representative.

The meeting closed with all hands rendering the Stein Song. Inasmuch as there has been a considerable change in the club roster during the past two years, a list of those present is appended so that their friends and classmates (no creditors) may catch up with them: E. F. Abbot, Jr., '31, L. W. Adams '03, E. G. Allen '05, R. E. Allen '29, E. G. Applegate '25, M. A. Babb '28, H. M. Barber '18, J. M. Barker '07, H. A. Barnby '23, J. W. Barriger, 3d, '21, S. E. Bates '11, H. P. Beers '34, F. J. Bittel '39, F. W. Boley '20, J. F. Borrowdale '35, L. H. G. Bouscaren '04, A. H. Brisse '36, E. P. Brooks '17, L. S. Brown '33, W. N. Brown '02, J. G. Brunner '34, W. F. Burrall '38, G. H. Burt '20, R. F. Cashin '19, C. E. Chase '03, C. W. Clark '08, J. R. Clark '41, R. W. Clyne '30, J. F. Coffey '39, N. Cohn '27, P. L. Coleman '23, J. V. Cook '23, R. D. Cooper '21, P. W. Creden '27, M. N. Dastur '41, G. C. Davis '18, J. M. DeBell '17, W. W. DeBerard '01, R. K. Deutsch '40, J. E. Dietzgen '41, J. F. Duffy '11, J. N. DuVernet '22, J. Elliott '25, R. H. Ewert '37, E. G. Farrand '21, L. A. Ferguson, Jr., '17, G. E. Fickett '34, J. M. Fitzgerald '02, R. D. Flood '96, F. J. Foley '20, J. M. Frank '07, W. J. Frisbie, Jr., '24, D. B. Gilman '32, H. J. Goldsmith '18, L. Green '87, J. H. Greenberg '40, S. P. Griffin '20, S. A. Guthrie '10, W. F. Hagestad '42, R. J. Hammerstrom '41, H. W. Hamilton '30, E. F. Hanford '16, J. Harrington '96, H. B. Harvey '05, R. D. Haworth, Jr., '39, C. C. Henry '23, H. A. Herzog '19, S. E. Heymann '39, W. H. Hildebrand '11, W. H. Hildebrand, Jr., '43, B. Hoffman '40, S. A. Hoffman '16, G. M. Holbrook '00, D. F. Holloway '38, A. J. R. Houston '22, M. R. Hubbard '43, L. L. Hunter '03, L. R. James '21, G. B. Jones '05, L. E. Jones '32, W. V. Jones '31, I. J. Kahan '23, I. W. Kahn '06, A. L. Kaye '31, D. H. Keck '25, N. R. Klivans '40, M. B. Knox '20, M. M. Kuban '37, F. J. Lammers '29, J. W. Lane '33, A. S. Langsdorf '37, A. J. LaPointe '21, E. J. Lemanski '40, H. Lockett '10, B. L. MacKusick '30, S. A. Marx '07, R. D. Mason '31, J. W. McCausland '18, W. C. McClure '26, A. B. McCullough '30, L. C. McEvoy, Jr., '38, P. J. McGoohan '35, L. L. McGrady '17, A. E. Meling '22, J. W. Mohlman '39, C. H. Mohr '33, P. W. Moore '01, G. Mottelson '21, F. L. Mowry '12, A. H. Munson '33, H. E. Mason '26, L. M. Nelson, Jr., '22, J. W. O'Brien '18, S. O'Brien '17, F. D. O'Neil '25, J. S. Offut '26, K. H. Otte '28, L. E. Packard '35, G. P. Palmer '04, H. S. Pardee '09, M. E. Parker '23, L. Pearse '01, L. E. Pepperberg '37, G. G. Perry '30, A. H. Peycke '11, H. S. Philbrick '06, S. A. Phillips '32, N. P. Pinto '42, L. Pirola '26, J. G. Praetz '28, J. H. Pratt '12, H. L. Pohndorf '41, A. N. Rebori '07, W. S. Roberts '32, W. H. Robertson '18, C. H. Ross '35, T. F. Russell '27, P. C. Rutledge '33, J. J. Ryan '35, A. F. Sawyer '18, A. T. Scannell '08, R. E. Schmidt '87, F. B. Schmidt '07, R. W. Scott '23, L. Sheldon '25, B. H. Sherman '19, R. J. Sholtz '22, P. H. Smolka '42, H. Sheldon Smith '31, R. M. Soria '39, T. B. Spruill '31, F. P. Squibb '23, W. Steinwedell '25, F. J. Starr '22, P. A. Stephenson '28, B. T. Stott '31, M. W. Tilden '10, G. E. Wallis '09, B. A. Weber '22, B. L. Weller '40, J. S. Wiebe '29, J. L. Wien '34, J. L. Wilds '11, O. B. Wiessner '26, D. V. Williamson '10, John H. Wills '26, Duncan M. Wilson, 3d, '42, E. L. Woodward '11, W. O. Wright '34, R. W. Vankirk, Jr., '18, W. G. Zimmermann '98. — EDMUND G. FARRAND '21, *Secretary*, United Conveyor Corporation, 37 West Van Buren Street, Chicago, Ill.

Technology Club of Hartford

On March 30 at Scoler's Restaurant in Hartford, an executive committee meeting was held at which Henry B. Kane '24, Alumni Fund Director, discussed ways and means by which our Club could participate more actively in the Alumni Fund campaign. A number of other members attended, at the request of the committee, in order that a broader range of points of view might be obtained for the matters to be discussed. The consensus of opinion was that the Club should do as much as possible to further the success of the Alumni Fund, in addition to whatever activity might be de-

cided upon as the "cause célèbre" about which interest in the Club is to be centered.

The spring dinner meeting was held on April 11 at the Italian-American Club, Hartford. George Malcolm-Smith, novelist and broadcaster, spoke on the topic, "Spites of Life," an interesting and amusing account of the oddities of the insurance business. President Frederick Almquist '23 presided over our business meeting. The report of the Secretary-Treasurer was accepted as read. A report on the executive committee meeting mentioned above was given by the Secretary, and general discussion ensued. The President was authorized to name a nominating committee of three to report at the annual meeting. This was one of our most successful meetings, 39 members and guests attending. — LOUIS J. PROULX, JR., '36, *Secretary*, 31 Wells Road, West Hartford, Conn. JOHN A. SWIFT '27, *Assistant Secretary*, Billings and Spencer Company, Corner Park and Laurel Streets, Hartford, Conn.

The Technology Club of New York

Approximately 180 Alumni, wives, and guests assembled at the clubhouse on March 25 for a housewarming and dinner in honor of Dr. and Mrs. Compton. The club quarters were opened for inspection at 4:00 P.M., and from that time until 6:30 P.M., cocktails and fishhouse punch were served. The reception to Dr. and Mrs. Compton took place immediately preceding the dinner. George, the chef, outdid himself in preparing an especially tempting buffet dinner, including, among a wide variety of choice dishes, turkeys and lobsters, with the usual side dishes and delicacies.

Following the dinner, George Dandrow '22, President of the Club, presented a leather-bound, parchment reprint of the guest list to Mrs. Compton. All the guests present had previously autographed this memento of the occasion, and the presentation was limited to a reading of the inscription, which ran as follows: "To Dr. and Mrs. Compton a warm welcome from our members and guests gathered here tonight in your honor at The Technology Club of New York: We are proud to have you with us. May this memento serve as a reminder of the continuing appreciation, respect and admiration of our Alumni body. And our sincere wish that the future holds a bountiful share of good health and happiness for you both as you carry on your great work for Technology — and America." This memento was handed to Mrs. Compton, as George Dandrow put it, in order that it might not become mixed up with Dr. Compton's portfolio on national defense work. Dr. Compton responded with a few gracious words of greeting to the Alumni and included an amusing anecdote of a non-confidential nature about one of his air trips during his recent visit to the war area.

Jack Teeter '22 was, as usual, his dynamic and entertaining self, acting as master of ceremonies in introducing Frank Gage '22, who brought to New York the first rendition of the new Technology song, "Sons of M.I.T." The vocal rendition was by Earle Styres, prominent radio baritone, with support from the entire gathering on additional choruses which appeared on a special announcement card at all tables. Throughout the evening, Jack Teeter and Frank Gage vied with each other in rendering entertaining music culled from Tech Shows of long ago, popular ditties of yesterday and today, and several widely acclaimed original pieces from Frank Gage's own pen. Jim Walker '26 proved that he has not lost his fine touch at the Steinway by generously contributing to the pleasure of the gathering off and on during the evening. For the benefit of the jaded Alumni of the Classes of '20 and earlier, lovely Julie André, international guest artist from New York's Penthouse Club, entertained with guitar and Latin-American folk songs. Senator Tom Desmond '09 rose to the atmosphere of conviviality by ordering drinks for the house, a gesture properly acclaimed and accepted by all present. Throughout the evening, the guests inspected the newly decorated club quarters, and the ladies present were unanimous in their approval of the new ladies' lounge and dining room.

Technology men attending with their wives included: Dan Adams '05, E. G. Bromilow '26, D. M. Broudy '22, C. J. Burke '22, A. B. Bassett '26, P. J. Byrne, Jr., '20, W. D. Binger '16, W. J. Barrett '16, A. R. Brooks '17, B. A. Bowman '09, F. L. Cronin '23, F. B. Cutter '98, E. H. Cargen '36, J. K. Campbell '11, P. T. Coffin '21, T. C. Desmond '09, G. F. Des Marais '20, C. G. Dandrow '22, G. A. Drew '25, J. M. Evans '16, Rolf Eliassen '32, L. H. Flett '18, S. W. Fletcher '18, J. C. Fruit '02, A. R. Gruehr '24, G. W. Gilman '23, W. J. Grady '22, L. D. Gardner '98, F. D. Gage '22, R. H. Gould '11, R. S. Hamilton '24, I. D. Jakobson '21, F. B. Jewett '03, W. L. Keplinger '24, P. F. Lavedan '20, W. J. Littlefield '17, F. W. Lord '93, M. B. Landers '05, W. H. Latham '26, J. J. Murphy '23, F. L. Mead '20, D. H. McNeal '23, Frank Maguire '17, N. C. Nicol '08, W. D. Neuberg '18, Miles Pennybacker '23, S. H. Reynolds '22, R. H. Ranger '11, Kenneth Reid '18, M. L. Radoslovich '26, J. V. Santry '06, G. J. Saliba '27, Nathan Schooler '24, E. B. Stockmann '17, J. H. Teeter '22, E. W. Vilett '22, H. E. Wellcome '17, Edward Wininger '24, R. E. Wilson '16, G. R. Wadleigh '97, A. L. Weil '01, J. G. Walker '26, C. W. Williams '15, W. P. Winsor '27, L. D. Wilson '20.

Other Technology men present were: J. C. Duff '86, P. E. Golsan '12, A. T. Glassett '20, R. H. Gould, Jr., '41, J. E. Jagger '24, D. R. Linsley '22, C. C. Ladd '30, A. N. Mooradian '34, Lachlan Mackenzie '22, W. I. McNeill '17, R. G. Macdonald '22, and G. R. Wiren '22.

Among the guests attending the dinner were: Mrs. J. F. Downey, Miss Ruth Flett, Mrs. Esther Haberstroh, Mr. and Mrs. H. K. Greer, Mr. and Mrs. C. H. Gummey, Mr. and Mrs. G. S. Rentschler, Lieutenant Commander and Mrs. C. E. Warburton, Miss Marjorie Nicol, and Mr. and Mrs. E. Shaw.

New members recently elected are: John A. Willard '09, consulting engineer, 75 Federal Street, Boston, Mass.; Richard McKay '21, industrial economist, Washington, D.C.; Chase Godfrey '40, chemical engineer, Kellex Corporation, New York City; Lawrence H. Flett '18, National Aniline division, Allied Chemical and Dye Corporation, 40 Rector Street, New York City; William J. Grady '22, 68 Park Avenue, Maplewood, N.J.; George W. Potter '22, Hewes and Potter, Inc., Boston, Mass.; Robert W. Barker '24, Hess and Barker, 212 South Darien Street, Philadelphia, Pa.; George J. Saliba '27, electrical engineer, 242 West 55th Street, New York City; Francis E. Manley '24, civil engineer, Rockland Light and Power Company, 12 North Broadway, Nyack, N.Y.; Richard H. Gould, Jr., '41, United States Naval Reserve; George T. Gilman '23, civil engineer, 420 Lexington Avenue, New York City; Bion A. Bowman '09, consulting engineer, 420 Lexington Avenue, New York City; George T. Bailey '22, 207 West 25th Street, New York City; George R. Weppler '37, general manager, Industrial Tape Corporation, New Brunswick, N.J.; Alan W. Crowell '25, assistant sales manager, 82 Audubon Street, New Haven, Conn.; Herbert Gfroerer '16, Executive Vice-president, Sound Scriber Corporation, 82 Audubon Street, New Haven, Conn.; Theodore G. Coyle '25, technical director, United Chromium, Inc., 2751 East Jefferson Avenue, Detroit, Mich.; Frederic W. Lord '93, Lord Electric Company, 10 Rockefeller Plaza, New York City; Richard H. Gould '11, sanitary engineer, 1800 Municipal Building, New York City; Ray S. Hamilton '24, general superintendent, Linde Air Products Company, 30 East 42d Street, New York City; Harold F. Smiddy '20, partner of a management counsel firm, Room 1104, 285 Madison Avenue, New York City; Saxton W. Fletcher '18, Vice-president, J. O. Ross Engineering Corporation, 350 Madison Avenue, New York City. — WILLIAM D. NEUBERG '17, *Secretary*, 24 East 39th Street, New York, N.Y. WILLIAM L. KEPLINGER, JR., '24, *Publicity Committee*, care of Johns-Manville Corporation, 22 East 40th Street, New York, N.Y.

Washington Society of the M.I.T.

The Society held its annual Ladies' Night dinner meeting in Barker Hall, Y.W.C.A., April 13, with a large attendance. Mert Emerson '04 presided. With Major Gaffney '28 at the piano and Major Fisk '22 leading the singing, the quartet and membership joined in "Take Me Back to Tech" and the "Stein Song," and during the course of the evening "Sons of M.I.T." was introduced, with Jack Teeter '22 aiding in the presentation. Proctor L. Dougherty '97 introduced Clifford K. Berryman, cartoonist, of the Washington *Star*, who discussed "Fifty Years as a Newspaper Man in Washington." Cliff Berryman gave a most interesting, humorous talk about personalities in Washington since the days of Grover Cleveland. He was thoroughly enjoyed by an enthusiastic audience. William K. MacMahon '22 introduced W. A. Wood, consulting engineer, who gave a most interesting off-the-record talk, "Behind the Scenes in Soviet Russia." Mr. Wood's knowledge of Russia is based on intimate experience in the interior of Russia during most of the past 14 years. He had a very appreciative audience.

We had a large attendance of ladies, and among the M.I.T. men present were the following: '89, G. W. Stone; '90, J. G. Crane; '92, B. P. Du Bois; '93, P. H. Thomas; '96, J. W. Clary, W. H. McAlpine, B. Stoughton; '97, P. L. Dougherty, F. A. Hunnewell, H. E. Worcester; '00, C. H. Stratton; '01, C. Bittinger; '02, H. M.

Chapman; '03, H. Crosby, R. Haskell; '04, M. L. Emerson, A. M. Holcombe, F. W. Milliken, G. C. Riddell, G. N. Wheat; '05, J. A. Furer, O. C. Merrill; '06, R. R. Patch, L. H. Tripp; '07, J. P. Alvey, A. Macomber; '09, B. A. Robinson, M. R. Scharff; '11, E. R. Hall, W. H. Martin, A. W. Yereance; '12, F. W. Barker, A. M. Pedersen, G. A. Robinson, R. E. Wilson; '13, L. W. Parsons; '14, H. V. V. Fay, A. E. Hanson; '15, A. D. Beidelman, J. W. Conover; '16, W. C. Swain; '17, J. P. Ferrall, A. R. Williams; '19, A. H. Blake, L. J. Grayson, E. M. Kenison; '21, L. W. Conant, M. H. Naigles, W. T. Smith; '22, H. H. Fisk, G. R. Hopkins, W. K. MacMahon, J. R. Morton, J. H. Teeter, R. K. Thulman; '23, C. M. Bouis, J. J. Gray; '24, G. E. Lamb; '25, R. Ilsley; '26, S. J. Cole, J. Y. Houghton; '27, E. H. Bramhall, E. G. Cowen, D. F. Horton, M. D. James, G. E. Thomas, S. C. Wang; '28, A. E. Beitzell, J. W. Gaffney, G. D. Mock; '29, J. A. Plugge, N. P. Stathis, F. W. Turnbull, R. Underwood; '30, A. F. Bird, M. S. Falk, Jr., C. W. Maskell, J. A. Mathews, C. S. Wang; '31, H. D. Randall; '32, G. A. Lowery, R. W. West, H. E. Worcester, Jr.; '33, W. L. Bell, Jr., C. W. Bohrer, M. E. Gardner; '35, E. C. Edgar; '36, G. D Mylchreest; '37, B. E. Bennison; '38, R. C. Coile, R. Muther, G. J. Stansfield, J. W. Steiner; '40, B. F. Greenberg; '41, C. H. Corliss; '42, Z. W. Wilchinsky. — FRANK W. MILLIKEN '04, *Secretary*, 613 North Greenwich Street, Falls Church, Va. WILLIAM K. MACMAHON '22, *Review Secretary*, Rosslyn Gas Company, 3240 Wilson Boulevard, Arlington, Va.

CLASS NOTES

1875

The Review has received word from Mrs. Bush of the death of William Hector Bush on March 24 at his home, 638 Woodward Avenue, Orlando, Fla. An Orlando paper gives the following information about his life: Mr. Bush was born in April, 1854, in Portsmouth, N.H., the son of Captain John Christian Bush, who was noted as the owner of clipper sailing ships, and as a boy Mr. Bush went on many trips with his father. His mother, the late Margaret Ingalls, was the daughter of James Ingalls, famous shipbuilder of Glasgow, Scotland. He was educated in Edinburgh, Scotland, and studied civil engineering at the Massachusetts Institute of Technology. He located railroads in Canada, Mexico, and the United States, and in later years was with the legal department of the Wabash Railroad as expert witness in engineering cases. In 1889 he headed an engineering expedition through the Grand Canyon, with experiences recounted in many magazines. The party, not heard from for four months, was given up as lost, until "the keen locating sense of Mr. Bush brought most of them through alive after a trek of 100 miles through the desert and petrified forest. . . ." emerging at Phoenix, Ariz. Mr. Bush is survived by his widow, Mrs. Esther B. Bush; one daughter, Mrs. Carmeleta B. Newbold of St. Louis, Mo.; and one son, William H. Bush, Jr., of Silver Springs, Md. Mrs. Bush reports her husband's pleasure in memories of his student days at Technology and of the 50th reunion in 1925 and his pride in the magnitude of the present buildings.

1877

We have had word of the death of Charles Atherton Clarke on April 27 at Watertown, Mass., and shall hope to give more particulars later. Your Secretary has been unable to get very complete data on the professional career and life of Francis C. Holman, who died on January 16, although he had seen Holman from time to time since Technology days. For several years he was located in and about Pittsburgh, Pa. Then he went to Central and South America, where he spent about 12 years.

Holman was handicapped by having sight in only one eye, but this did not deter him from energetically following his profession in mountainous regions. He was entirely fearless in climbing high peaks which were generally considered dangerous and difficult to climb. When the sight of his hitherto good eye became affected, he gave up his professional activity and settled in California. He made his winter home in Carmel and his summer home in the Yosemite.

For 17 years Holman was custodian of the Sierra Club Lodge in the Yosemite and as such he was a fountain of information for the club's many visitors. He knew every square foot of the Valley and its adjacent territory. He was an authority on western ornithology and in his later life claimed that he still had two hobbies — mountains and birds. He was a man of high standing and character — a pleasant man to meet, but reserved and reticent about writing or recording his experiences or accomplishments. — GEORGE W. KITTREDGE, *Secretary*, 592 North Broadway, Yonkers 3, N.Y.

1887

Your Secretary has received the sad news of the passing of our classmate, William B. Blake, at his home in St. Petersburg, Fla., on April 6, after a lingering illness, according to a letter from Mrs. Blake. In September last he underwent a serious operation and apparently did not rally from the shock, and after a long period of suffering during which he gradually grew weaker, he finally passed on.

He was born at Newburyport, Mass., October 2, 1865. He was graduated from the high school in his native city and from the Course in Civil Engineering at the Massachusetts Institute of Technology in 1887. He spent the summer of 1885 as a transitman on the Boston and Maine Railroad and the summer of 1886 as an instrumentman on the United States Geological Survey.

During the summer of 1887, he was engaged on bridge work on the Old Colony, now a part of the New York, New Haven and Hartford Railroad. On September 17, 1887, he entered the service of the Pennsylvania lines west of Pittsburgh, at Louisville, Ky., and gradually rose through the various grades until January 10, 1903, when he was promoted to assistant real estate agent of the Southwest System, with office in the Pennsylvania Station at Pittsburgh, where he was located until his retirement 27 years later. He was a charter member of the Engineers and Architects Club of Louisville, and in 1916 he was elected president of the M.I.T. Club of Western Pennsylvania at Pittsburgh.

On the termination of Federal control of railroads he was appointed assistant real estate agent, Central region, and effective January 1, 1924, was appointed engineer of right of way, from which position he was retired on November 1, 1930, after a continuous connection of 43 years with the Pennsylvania Railroad system, and his name was inscribed on the roll of honor.

For the past seven years he had made his residence in St. Petersburg, Fla., where he and Mrs. Blake have lived at 2836 Sixth Avenue North. The sympathy of the Class of '87 goes out to Mrs. Blake in her bereavement, and we mourn the loss of a valued and distinguished classmate.

As these notes are being forwarded to the office of The Review, our classmate, N. P. Ames Carter, and Mrs. Carter are observing their 50th wedding anniversary at their home, 22 Grove Avenue, Chicopee Falls, Mass. On behalf of the Class, your Secretary has extended greetings and the sincere hope that they may enjoy many more anniversaries in the years to come. — NATHANIEL T. VERY, *Secretary*, 15 Dearborn Street, Salem, Mass.

1888

As intimated in our notes for May, these are being sent from Newport, R.I., where your Secretary has another daughter and son-in-law, James R. Hughes, Jr., a lieutenant, junior grade, and assistant paymaster at the Naval Training Station. During the past 51 years since your Secretary's last visit to Newport, many additions have been made to the naval establishment here, but as any description of these might give "aid or comfort" to the enemy, he will say nothing.

The big headline of these notes is a letter dated March 30 from our honorary representative in the United States Navy, Katharine Keough, an ensign in the Naval Reserve, stationed at the Naval Training Station, Sampson, N.Y. She is the brilliant daughter of a distinguished father, William T. Keough, naval architect and marine engineer, also winner of the highest honor in military drill at our freshman ball in 1885. Ensign Keough is a graduate of Smith College. She writes as follows: "Your letter was most welcome and greatly appreciated. It followed me here to Sampson. I did try very hard to find out a bit more about your ship but was unsuccessful in our library here. You well know, of course, who Sampson was. I was quite proud of myself that I did, too, when I arrived. They indoctrinated me well in naval history at Northampton. I feel highly honored to be elected an honorary member of the Class of '88, which was always so close to my father's heart. I well remember how he looked forward each year to his class reunion. I am so glad that I visited the Boston Navy Yard when I was at home, because I'm afraid that I shan't have any chance to see naval ships for the duration. We are very busy with our recruit training here. I am glad to say that I have been able to release a man to go to sea. I supervise the receiving and checking of the records for the thousands of 'boots' that we train here. The work is interesting, but once in a while I do get tired of signing my name. At present I have to do it about

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5,000 times a week. My brother Jack is a captain in the Army. He is still at Fort Devens. He was recently graduated from the advanced infantry training course at Fort Benning, Ga. Paul was in the Army under the volunteer Officer Candidate School program. When it came time for his group to go to O.C.S., none were accepted. Since he was then over 38, he was released. Mother had, briefly, the distinction of having the three of us in the service at the same time. I do hope that you are well and will be able to enjoy the summer at Chebeague Island."

There were only two of us at the Alumni Banquet, Brown and Bridges, who sat at the same table with '87 and '89. Bridges says that a fellow townsman of his has bought Charlie Stone's summer place at Plymouth, "Rocky Point," where the Class spent the largest part of the day on the way to Wianno to celebrate our 25th in '13. We still remember with keen delight our swim in his concrete pool, the banquet on the lawn to the music of the Plymouth brass band, and the athletic sports. Bridges says his broken leg is O.K. now but needs much care.

Henry Bates is our prize digitalis farmer, having 180 acres with over 10,000 plants! He does a large part of the transplanting himself in spite of his knee, which is still a little stiff. He thinks the radio commercials should take a lesson from Swan Soap and Johnson's Wax and vary their programs. I agree with him. His daughter put up 670 pints from their war garden last fall and will more than duplicate it this year. Some daughter!

Edwin R. Pearson, electrical engineer and inventor, started with the Class of '87 but graduated with us; hence we learned of his demise only recently from our good friend, Lonsdale Green'87 of Chicago. He died suddenly on January 28 at his home, 208 Broad Street, Portsmouth, N.H. We give a very complete summation of his career and accomplishments by quoting from the Boston *Globe* of January 30, as follows: ". . . A native of Portsmouth, he was graduated from Massachusetts Institute of Technology in 1888. He first went to work for the Thompson Houston Electrical Company in Lynn, Mass., a forerunner of the General Electric Company, and continued with the G.E. when it took over the Lynn company. For 10 years he was attached to the Schenectady branch. While there he worked on the Niagara Falls installation. Later he was transferred to Pittsfield, Mass. Upon his retirement in 1915 he returned to Portsmouth, but continued until 1926 to serve as a consulting engineer for the General Electric. During his career he became noted as a designer of transformers. He was a member of the American Institute of Engineers and the Jovian Society of Inventors. His sister, Miss Helen Pearson, . . . survives."

Our next broadcast from Station BRTC will be from Chebeague Island, Casco Bay, Maine. — BERTRAND R. T. COLLINS, *Secretary*, Chebeague Island, Me. SANFORD E. THOMPSON, *Assistant Secretary*, The Thompson and Lichtner Company, Inc., 620 Newbury Street, Boston 15, Mass.

1889

Our 55th anniversary was observed on the afternoon of February 26 by seven classmates who gathered at the Secretary's home for a social hour. These men, all of whom appeared to be enjoying the occasion, were Luther Bridges, E. V. French, R. D. Hall, F. W. Hobbs, W. W. Lewis, W. L. Smith, and W. H. Kilham. Letters received from various distant members were read aloud. As the gathering dispersed, wishes were freely expressed that we should meet again for the 60th, but not wait until then for a meeting. The Secretary now has 79 names on the mailing list, 43 of whom replied to the postal card; so the Class is still showing good evidence of vitality.

Zenas Bliss sent an interesting letter from his hideout in Texas, the language of which is so colorful, like everything Zenas does, that the Secretary will not attempt an abstract but reproduce it herewith: "Your kind invitation for February 26 finally reached me here on my return from a run along the border, and you will see from the letterhead that I am again out in the wide open spaces where men are men, etc., and transportation being what it is, that it is impossible for me to get to Boston. I am sure you need no assurance as to how disappointed I am not to be able to be present at this gathering of the members of old '89, and to grasp the hands of the friends and companions of my youth; I shall be with you in spirit, however, and drink a toast here in this distant state to the great Class and wish for each and all good luck, good health, and prosperity.

"Not having seen or heard from me in some time, you may wonder what has been happening to me, and in a way it has been plenty, but on the whole the good has predominated. Now, Walter, you have known me for a long time and have observed that I have always been good, and, although you may not have noticed it, I have also been careful; hence the refrain of one of Kipling's poems to the effect that 'The female of the species is more deadly than the male' has had only an academic interest for me, but I overlooked one fact: the potentiality of destruction inherent in an automobile piloted by one of the fair sex. Philosophers and poets may disregard facts almost, if not quite, with impunity, but such indulgence is very dangerous for engineers, and I demonstrated the soundness of the foregoing proposition by getting the tendon Achilles in my right leg ruptured. It was this way: On October 5, 1942, I was returning in a taxi from a meeting of financiers and such to the dignified obscurity of my private abode. An auto shot out of a side street and stalled directly in my path. Noting that a collision was inevitable, I devoted my time and attention to preventing my head from going through the glass partition between me and the driver and was successful. But in the shuffle I temporarily forgot about my lower extremities, and the result was the ruptured tendon Achilles. It was nine months to a day before I could navigate under my own power without artificial aids in the shape of crutches or canes; I am happy to say, however, that my mobility at present is approximately 90 per cent.

"I have noted of late in The Review, and some other more or less reliable sources, that many of my classmates have been indulging in that popular indoor sport among the middle-aged, to wit: golden weddings. I would not have my classmates think that I was remiss in this regard, so I will tell you that we celebrated our golden wedding anniversary on October 26, 1942. You will note that this date is rather close to October 5, 1942. You guessed it: Our celebration was pulled off in the hospital. The situation was not so bad as the circumstances seem to indicate, and I am entitled to no sympathy on that score, for 'dear friends and gentle hearts' were there to help us celebrate, and flowers, cards, and other reminders of a long and happy married life were in profusion, and all 'went merry as a marriage bell.'

"I suppose you have noticed the shortage of gas even in Boston; that shortage, combined with the induction into the armed services of his country of my chauffeur and with a game leg for almost a year, rather cramped my mobility; my movements were practically confined to going to and from my office, but from now on I hope to do better, and as soon as I get back I will take another day off and run down to Boston for a little conversation and *perhaps* a 'beverage,' as the bottom line on the menus in this neck of the woods is wont to say. I do not need to stress, I am sure, the fact that my regret at not being able to meet with you and my other friends at this time is both deep and sincere, and I wish you would tell them so."

George Orrok of Riverside, Conn., died on April 6. He had hoped to meet with his classmates on February 26 but was prevented. The following is from the New York *Herald Tribune:* "George Alexander Orrok, consulting engineer, for many years mechanical engineer and consulting engineer of the New York Edison Company, and widely known as an authority on power plant engineering, died today at his home. . . . He was seventy-seven years old. Mr. Orrok, who had been associated since 1931 with David Moffat Myers and W. A. Shoudy, of 21 East Fortieth Street, in independent consulting practice, joined the New York Edison Company in 1898 and in 1905 was appointed mechanical engineer. From 1914 until 1928, Mr. Orrok was consulting engineer for the New York Edison Company, during which time he worked on the design of many of the large power stations of the company as well as a number of large hydro electric projects. Mr. Orrok also was consultant on problems associated with steel-making, floating dry docks and with gas and Diesel engines. He advised on projects undertaken by the New York City Board of Water Supply and worked with the Navy Department on the Panama Canal. Mr. Orrok contributed considerable original research in the field of heat transfer, in condensers and furnaces, and organized and directed research on the properties of high pressure steam. Born in Dorchester, Mass., Mr. Orrok attended the Massachusetts Institute of Technology and the Stevens Institute of Technology. Before he joined the Edison Company, he passed six years on miscellaneous design and construction problems, including street railways and coal mines. From 1911 to 1914 Mr. Orrok taught steam engineering at Brooklyn Polytechnic Institute. He served at various times as lecturer in his special fields at Yale, Harvard and Princeton. In 1929 Mr. Orrok received an honorary degree in mechanical engineering from the Stevens

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Institute. He was co-author with Professor Robert Fernald of the book 'Engineering of Power Plants.' Surviving are his wife, Mrs. Elene Orrok, a son, George A. Orrok, Jr., of Boston, and a brother Henry Orrok."

The Secretary has been furnished with the following excerpt from the pen of a well-known columnist. From long acquaintance the Secretary is convinced that Harry is generally right. "From Henry Howard, the Boston consulting engineer, who spends his summers in Newport, R.I., and his winters in Miami and Nassau where he has a home, anent jaywalking: 'A little thought should convince anyone that the middle of the block is the safest place to cross a crowded street when traffic is stopped by red lights, and that the crossing at corners is the most dangerous because of cars quickly turning on you from cross streets.' " — WALTER H. KILHAM, *Secretary*, 126 Newbury Street, Boston 16, Mass.

1891

Our old friend and classmate, Arthur H. Alley, passed on at La Jolla, Calif., on April 21. His sister wired Harry Young, and as Harry has known Arthur better than most of us, I asked him to write something for The Review. He complied as follows: "My early recollections of Arthur Alley were associated with his father's home in Jamaica Plain, up on a hill off Center Street. It was one of those Victorian mansions of pre-Civil War days. I lived about three miles away, a distance considered close for neighbors in those days in West Roxbury. I think we both rode horses. In the basement there was a pool table which we boys used. There were three boys, Fred, George, and Arthur, and Matilda, the only girl, whom we called Tilley. The father was a dignified old gentleman, who wore side whiskers, and was six feet tall or more. He came with Mrs. Alley from Ireland and established the Alley Breweries, where Alley's Ale was made for years, and it was good ale.

"At his death Arthur and George took the business over, and when the Massachusetts Brewing Company was formed, it was taken in, Arthur and George becoming, I think, vice-presidents. With Prohibition, the company was liquidated, and Arthur moved to California with his mother and sister. He bought a lemon ranch in National City. Some of us have visited him there and will remember their hospitality. To simplify living during the shortage of help, Arthur and his sister took a bungalow in La Jolla, Calif. Matilda is the only member of the family left. Arthur took Course IX and was a member of the Theta Xi fraternity. After his mother died some years ago, he and his sister came East every summer and went to Scituate. Neither he nor his sister ever married. One year I met them in France. They had been on an extensive trip through Egypt and the East.

"At one time they had a place at Norwood, where he had some good horses. Once we had a Class of '91 meeting on his place, and he showed us his horse, which went over the hurdles for us. Arthur was a regular attendant at our meetings while he lived around Boston. Once when we had a '91 athletic meeting at the race track in Readville, he and I had a walking match around the track in which he took the first prize. Always sociable, hospitable, and good company, he will be missed by those who knew him. I had a letter from him only a short time ago, and his sudden death will be a shock to all of us."

We regret to report the loss of another of our loyal classmates. John Putnam passed away at West Haven, Conn., on April 14. He had not been in good health for some time and about a week before, had had a fall which may have contributed to his death from hemorrhage. We were all fond of John, and he attended many of our parties, but was unable to come to our 50th. He retired from business several years ago. According to our last records, he left three daughters and two grandchildren.

We have just heard, through Bert Kimball, of the death of Francis S. Viele, which occurred on April 10 at the Good Samaritan Hospital in Palos Verdes, Calif. He is survived by his wife, Florence. The Palos Verdes *News* of April 21 made the following comments: "Mr. Viele, a resident of Palos Verdes for the past five years, was a graduate of Massachusetts Institute of Technology and was a retired electrical engineer for the Arizona Power Company. While living in Palos Verdes he served on the Park Board and was extremely interested in civic affairs."

Since the April notes we have had several interesting communications from classmates — for one, a nice long letter from Arthur W. Pierce of Pittsfield, Mass., whom we so gladly welcomed at our 50th reunion. He says, in part: "As I mentioned in my reply to the class dinner bid, I am connected with a group of blind people, seven men and one woman, who are doing war work, mostly subassemblies on small capacitors, on contract with our local General Electric plant. I find the work interesting and the gang quite co-operative. They have varied backgrounds. One, born in Crete, has had a checkered career as coal miner, saddle tramp, rodeo cowboy, papermill hand, water-electric power plant attendant, etc. He now lives in a small house he built himself, cares for his hens, cows, etc., chops and saws his own wood, and comes five or six miles to the workshop. Our fastest worker is a young Portuguese from Cape Cod. Next to him sits a born and bred Yankee, who worked at the General Electric for nearly 20 years and had an accident which caused the removal of one eye and very seriously impaired the other. Next to him sits a man who was born in Austria and came to Adams when he was a small boy. He had had experience in cotton mills and filling stations till he lost his sight 10 to 15 years ago. The woman locally born and bred has been blind since she was a young girl and is a Perkins Institute graduate. The French Canadian from Holyoke is also a Perkins Institute graduate. He is now studying machine-shop work in Springfield.

"I heard from one of the blind men in the shop, not connected with my gang, that Uncle Horace Ensworth was in Pittsfield on a short business trip in connection with telephone work a few months ago, but I missed seeing him. I have enjoyed reading the '91 notes in The Review, but was sorry to learn of the passing of Bird and Swan and Gottlieb since our 50th. I average 9 to 10 miles a day on my bicycle and rode every day but two this last winter. My family, including one son who is a captain in the operational section at Mitchel Field, L.I., is getting along nicely. My daughter's four children keep things lively for their grandmother and me."

A letter from Hanington expresses regret at Jim Swan's death, as have those from others. Charlie's letter from Denver, dated April 14, reads in part as follows: "We are having regular Colorado Springs weather, rain which turns to snow, and last week 16 inches of the latter, which, however, was gone in two days. The range to the west of us is perfectly white. Many venturesome souls who drove to the hills for the week end were stalled in snowdrifts and slides. Thirty-four spent three and four days atop Berthoud Pass in a shelter cabin, unable to get down, and at 12,000 feet the nights are none too warm. Our director, Mr. Bailey, showed a film in Boston a short time ago on the Navaho country, which you should have seen, as it is an outstanding one. He also showed it before the National Geographic Society in Washington, and the comments on it from newspaper accounts were very flattering."

Ed Smith sends me one of his philosophic letters, which I enjoy, especially when he comments on the records or past history of our classmates: " 'The moving finger writes . . .' Jim Swan has passed into history — the history of '91, the history of M.I.T., and the history of the nation. And what a fine record it is, making a name for him in naval architecture and reflecting credit on Technology. It is a privilege to have enjoyed his comradeship at the Institute. The passing of A. C. Smith is also noted with sadness. He was not on the same basis of intimacy as was Swan, but he was a fine, likable chap. He and I used to discuss politics — especially protection and free trade. He was an advocate of protection; and I, a stalwart proponent of free trade. It may have been a sop to my poor argumentation when Coggin, after listening to the pros and cons, remarked: 'I think E. C. has the best of the argument, but I side with A. C. Being a poor, deserving young man, just starting out in life, I hope that I land in a well-protected industry.' A. C. is an exemplification of the versatility of M.I.T. training. Who would imagine an engineering student starring in poultry raising? Which all goes to show that he who acquires the basic principles offered by M.I.T. can star in any occupation."

Walter Douglass sends a postal from Daytona Beach, Fla., stating that he is leaving there on March 22, for Fort Belvoir, Va., and says he will write us shortly. — Gorham Dana, as chairman of the Brookline (Mass.) Planning Board, recently made his report covering the year's work. Owing to Gorham's interest and activity in this subject, Brookline stands in the front rank of towns devoting real attention to this important problem.

A letter from Fred Wilson in Nahant, Mass., starts out with his regret at Jim Swan's death, and mentions his friendship for Jim when at Technology. He says: "Jim was fond of music, and we attended many concerts together down in the old Music Hall in Boston.

"I have little to tell about myself. My most bothersome job is being on the draft board for three towns, of which my own

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town of Nahant is one. It is a bore, but it seems to be the sort of thing I can do at my age, and so I stick to it. Various committees and trusteeships keep me busy, especially as my own home has always taken a lot of time. I have many rare shrubs. I can count from my piazza ten or a dozen varieties of lilac and a large number of fine flowering crabs. Food raising gets much attention now, and I have a considerable area devoted to that. Gardening is my hobby, especially the shrubs. I have to have help, of course, and my place would rank as a one-gardener place; although if I could afford it, it would be much more perfect. But the depression years hit us so hard that we have to count the dollars fairly carefully.

"I am still holding my job as moderator of town meetings, and this month's annual meeting will be the 64th meeting — not all annual, of course — over which I have presided. I am also still the head of our public library, after 47 years of service as leading trustee. The library is large for a town and ranks high in efficiency. I retired this year as president of the Lynn Historical Society, after 12 years in that office. I am still vice-president of the Essex Trust Company in Lynn.

"And so you see what I have been doing. I am busy enough, but not remuneratively. Our business closed out last year, but we are yet trying to let go. Loose ends can bother. I think I am well, even if my wife won't let me shovel snow. She says a man died once doing that. But then bed is a dangerous place. Lots of people die in bed. My best regards to you as one of the small group who jack up the interest in our Class and its affairs, and I am sure it is a worth-while effort. The last '91 man I saw was a month ago, when I met Arthur Hatch, who was looking well and hearty and not showing age. An old man is always a man 20 years older than oneself."

Walter Hopton writes from Syracuse, N.Y., on March 6: "Please change my address in your class and fraternity records from 311 Summit Avenue to 1127 Lancaster Avenue. This means that I have sold my 13-room house, which I built and lived in for 36 years, and have moved into a 6-room apartment at the new address. The house got too big for the two of us, with the scarcity of help, and we are no longer spring chickens. It was advisable for us to distribute our possessions while we still had strength to tackle the job — and it was some job, with the accumulations of all these years. I have not made any business trips because of war conditions, gas rationing, and the state of the highways during the winter, but expect to get started next month, as I have enough coupons to take trips of 150 miles or so."

A recent letter from Howard Forbes says that he is improving slowly since his serious "upset" in 1942, especially in walking, so that he can get around the house with help. We all hope that he will get steadily better.

Morrill Ryder wrote in March that he had recently had a fall, but that no bones were broken and he was then all right again. He added: "The lesson to me, as of the Class of '91, is not to be off balance at the bank or on an icy sidewalk. My two younger sons are in the Navy; they and my eight grandchildren keep me busy writing letters."

We have just heard from Charlie Ricker, who has been in Havana all winter. He was not feeling so well when he left, but says he is better and plans to start back to the States about May 1, going first to Washington to visit his son and family and then to his farm at Salamanca, N.Y. He says: "I have not made plans for the summer and can't until I have had a chance to see son Charles, work myself out a bit, and consult the doctors in Cleveland. Last season I tried to do too much at the farm and knocked myself out and must be careful this year. I am very anxious to go to Boston and the White Mountains, and if traveling is not too bad, you will see me."

We have not heard from our Florida winter residents, Bowen, Walker, and White, but assume that they will come back to good old New England when the danger of our nice cold and snappy weather is over. The trouble is that some of us may be jealous of their sojourn in the sunshine of Florida and are restive at being kept with our noses to the grindstone. — HENRY A. FISKE, *Secretary*, Grinnell Company, Inc., 260 West Exchange Street, Providence, R.I.

1896

The annual report on the Alumni Fund, which will come to you in the mail in due course, shows that for the year ending March 31, the Class exceeded its quota of 89 contributors when it actually reached 96 contributors, or 108 per cent of its quota, and its total contributions were $1,582.50, which, however, was only 77 per cent of its quota of $2,050. The average contribution was $16.48. It is evident that the Class responds well in number, but does not cheer Henry Grush, our Class Agent, unduly in the total of its contribution or of the average contribution. The average quota which has been set for a Class that has been out as long as '96 is $23.00. Obviously not all of us can give that amount, but with those who can give larger amounts we ought to come nearer to our goal than to that of last year. On April 25, the day when these notes are being written, the returns since the current year campaign started on April 1 show that in 25 days contributions have been received from 57 members of the Class, and the total from these 57 is $889, or an average of $15.59 per contributor. While this is cheering in one respect, that in less than a month we have heard from about two-thirds of the quota of contributors — it is disappointing in that the total of $889 is less than one-half of the quota of money, and that the average is less than the final average of the year that has just ended. What can be done is indicated by the record of the Class of 1894, which in only 20 days from the time the new year started on April 1 went over the top, and is still going strong. Certainly our Class is not so far below the Class of 1894 in potentialities as these figures would indicate.

The Joe Clary incident was mentioned last month, and it now develops that Joe was here in Boston because of the death of the widow of his brother Willard, and Joe was kept busy here for a week. His sister Julia still lives in her apartment in West Roxbury, and she will be 90 years of age in June. Joe himself expects to retire in August from his job in the Bureau of Ships in Washington.

Father Partridge has written from Jericho, L.I., to the effect that he has never fully recovered from being hit by an automobile in New York City during a dimout a year ago. He gets around, but does not consider that he is any longer an active man.

Lythgoe received considerable newspaper publicity over the report he made in early April at the opening session of the annual conference of the Association of Food and Drug Officials of the United States in St. Louis, Mo., in his capacity as director of the food and drug division of the state department of health in Massachusetts and president of the Association of Food and Drug Officials of the United States. Lythgoe stated that in Massachusetts alone food inspectors confiscated 30,863 pounds of decomposed meat in 1943 and made 83 prosecutions, with 77 resulting convictions. According to Lythgoe, the amount condemned was much greater than that seized during World War I, and he ascribed the increase to the rationing program, where bad meat involves the loss of ration points for the dealers. He felt that the sale of decomposed meat and meat products cannot be prevented entirely, but sales can be reduced and made unprofitable. His declaration brought immediate rebuttal by Office of Price Administration officials, who pointed out that the amount of bad meat per individual in Massachusetts was relatively small and that meat rationing regulations allowed retailers to sell meat at lower point values and at lower prices where there was danger of spoiling. Lythgoe has not been accustomed to make statements without evidence to back them up, and the situation which he describes is undoubtedly true. There seems also little question but that, in addition to the bad meat which was seized, there was a lot of spoiled meat which escaped seizure and was sold in one way or another, but generally for Hamburg steak, lamb patties, sausage, frankforts, and bologna.

It looks as if Myron Fuller were scheduled to stay in Texas for the duration. The local ration board there which had promised him enough gas to drive back to Boston early in May later rescinded their action and gave as a reason a change in regulations. Myron has so far made no further plans.

Harry Baldwin in Swampscott has accomplished a very much worth-while objective for the town. As a former selectman he has always been keenly interested in town affairs and in town progress, so that back last September he submitted to the board of selectmen in Swampscott a proposal for a memorial town hall to Swampscott's soldiers and sailors of all wars and Elihu Thomson. This proposal involved the purchase by the town of the fine Elihu Thomson estate and buildings located near Monument Square and conversion of the building into a new town hall to replace the existing wooden structure, now 84 years of age. This matter received careful consideration by the selectmen, with the result that a special town meeting was called. Lively discussion took place, with arguments strongly advanced both pro and con. The final outcome was that at an adjourned town meeting held on April 11, the town by a vote of 112 to 16 decided to acquire the estate at a cost of $30,000 and to

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appropriate a similar amount to convert the property to municipal use as a memorial town hall. The final satisfactory outcome is another feather in Harry Baldwin's cap, and naturally he is very happy over the result, so that he expresses the hope that the members of '96, as well as the Alumni of M.I.T., will rejoice with him in the perpetuation of the estate of Elihu Thomson, who had so much to do with Technology.

Victor Shaw wrote on April 10 from Sandberg, Calif., to say that he was back in the hills getting his lungs filled once more with mountain ozone and enjoying the opportunity to tramp over the hills or real mountains at an altitude of about 4,000 feet on the boundary between Angeles and Kern counties. He is feeling much better by getting up from lower altitude and is very pleasantly located in a modern bungalow at the head of Liebre Canyon. He has been through what the old-timers describe as the worst winter in over 50 years with a snowfall of four to six feet on the level, all roads blocked, telephone and power lines down. Occasional snowfalls still persist, and there was enough to give him a white Easter morning. That snow soon disappeared, and spring was definitely arriving when he wrote. The description of his surroundings, with four acres fenced in containing a small orchard of peach, plum, and almond trees, and a grape arbor of Concord and white grapes, was very attractive. There are roses and lilacs and other shrubbery around the house, a good garden area, and a good-sized blackberry patch. He has plenty of water for irrigation in dry weather, and since the pipe-line intake from a creek of higher altitude gives him a fine head, he is well protected against fire. He is on a daily mail line and has a good dirt road taking him a mile and a half to the old Ridge Route and the old Sandberg Lodge and post office. There is plenty of wild game, although he has yet to see any mountain lions. His bungalow has three rooms and a bath, and is heated and lighted by natural gas. It sounds as if he were just as comfortable and happily located as the people in the South Sea islands who loll on the sands and have only to wait for the coconuts to drop into their laps.

Con Young did himself proud by sending the Secretary another long letter the first of April. The most important item was that he and Abby were about to trek North and would be back at their summer home at Bass River on Cape Cod on and after April 26. He said he had not been seeing so much of Irv Merrell recently because of the limitation of travel under gas rationing in Florida. Irv had had an awkward fall a few weeks previous which had shaken him up, but fortunately had not broken any bones. Con is still occasionally a boy again, as evidenced by the episode he relates of a trip to the Gulf beach for a swim and noon luncheon during the third week of February. He wandered along the beach looking for shells and exposed himself unduly to old Sol, with the result that, as he said, he slept for five nights on only two or three points of bodily contact with the bed sheet. This story sounds very similar to one which he related a few years ago, and it looks as if Con, like many others in the Class, will never grow up. He was very happy when he wrote the letter because he had completed a computation of his income tax and had gotten it into the Internal Revenue office well in advance of the deadline.

Charlie Tucker has come through with detailed information on Gene Laws' last illness. It seems Gene went to the hospital and underwent a bladder operation and the removal of a large kidney stone. That operation disclosed that an operation was called for on the prostate gland. Unfortunately pneumonia developed after the second operation on Wednesday, and Gene passed away on the following Sunday. It seems that he had not been in the best of health even back last fall and had recently suffered a heart attack. Gene had been taking an active part in the civic affairs of the community, being treasurer of the Federated Church of Ashburnham and having served six years as town assessor in Westminster.

Vernon C. Wood has given some additional information on his brother Willett, whose death has already been reported. Back in 1932 Willett suffered a paralytic stroke from an embolism. This had confined him to his bed, but his brain had continued clear and active as ever, so that he enjoyed reading and the radio, particularly the reports of baseball and other sports. Moreover his spirit was excellent all through his illness, and he was able to eat and sleep normally. — CHARLES E LOCKE, *Secretary*, Room 8–109, M.I.T., Cambridge 39, Mass. JOHN A. ROCKWELL, *Assistant Secretary*, 24 Garden Street, Cambridge 38, Mass.

1897

A. Elliott Kimberly, V, died suddenly of a heart ailment in his office in Columbus, Ohio, on April 21, at the age of 67 years. He leaves his wife, one son who is an engineer with the Chrysler Corporation in Detroit, one sister, and a grandson. At the time of his death he was sanitary engineer for the Ohio State Department of Health. He was in charge of all sanitary construction for the Lockbourne Army Air Base and for the enlargement of Fort Knox, Ky. For many years he was sanitary engineer for the city of Columbus. After graduation he was located for a number of years in Lawrence, Mass., at the experiment station of the state department of public health, leaving there for the work in Ohio.

He was a member of the American Society of Civil Engineers, the Society of American Military Engineers, the American Water Works Association, the faculty club of Ohio State University, the Shrine, and the Knights Templar. He was one of the founders of the Columbus contract club.

The passing of Kim will be deeply regretted by his classmates, for he was well liked by all. Your Secretary can see him, as if it were but yesterday, in his long linen coat, as he worked in an adjacent aisle in the chemical laboratory. Later, when he was located in Lawrence, he was one of a group of Technology men consisting of Gage, Phelps, Norris, and your Secretary who tried to carry on their work to the glory of their Alma Mater. — JOHN A. COLLINS, JR., *Secretary*, 20 Quincy Street, Lawrence, Mass.

1900

Harry Osgood writes from Washington: "I am still in harness with the Ordnance Army Service Forces but may make an escape at the first favorable opportunity. Confinement of man or beast is unnatural. I work and eat here in the Pentagon six full days a week and on the seventh enjoy a day at the farm. Soon the farm will require all my time, which is a reasonable basis of resignation. Other excuses avail not. The Pentagon is a heaven for anyone wishing to work, as race, creed, or color is no bar. Young women, married or single, white or colored, predominate, with rejected or over-age males and a large assortment of officers. All in all, it is part of the service requirements. The farm is taking on all its attractiveness and activity. Planting is in full swing. Wheat and grass are growing. Animals are being turned out to pasture. Trees are leaving and shrubs blossoming with life and freedom unrestrained."

Willard W. Stone, late of 43 Landing Road, Glen Cove, N.Y., died at Nassau Hospital, Mineola, N.Y., on February 11. Mr. Stone was born at Brookline, Mass., on October 23, 1873, and attended high school at Taunton, Mass. He had been with the city engineering department of Taunton from June, 1893, to September, 1896. After graduation from the Institute he worked at designing a sewerage system for the city of Washington, D.C., from August, 1900, to July, 1902. Subsequently he held the following positions: resident engineer of New York state highway construction in Onondaga County from July, 1902, to February, 1906; assistant engineer for the board of water supply of the City of New York from February, 1906, to June, 1913; senior highway engineer with the United States Office of Public Roads from June, 1913, to April, 1914; engineer for the New York state highway commission from April, 1914, to April, 1916; engineer for the Portland Cement Association, designing concrete highways in North Carolina, South Carolina, and California from April, 1916, to June, 1917; engineer at the Federal shipyard, N.J., from June, 1917, to January, 1918; superintendent of construction for Snare and Triest Company on construction at the Raritan Arsenal, N.J., from January, 1918, to 1920; with the county engineer in the department of public works, Nassau County, N.Y., from July, 1923, to the date of his death. He was a member of the American Society of Civil Engineers, the Society of American Military Engineers, the Methodist Church of Glen Cove, N.Y., and the Glen Cove Republican Club. He leaves a sister, Florence H. Stone of 147 High Street, Taunton, Mass.

We also regret to record the death on March 19 of John Brown, I, whose address was Los Angeles, Calif. — C. BURTON COTTING, *Secretary*, 111 Devonshire Street, Boston 9, Mass.

1901

Al Higgins was in New York City for two or three weeks earlier this year to carry through to completion the refunding of the outstanding bond issues of the Florida Power Corporation, of which he is president. *Power Lines*, the house organ of the corporation, says in part: "Highlight of the many details incident to the refunding program — and the one that caught the eye of those who saw it — was the presentation of the FPC story by word and picture. Mr. Higgins had prepared many

1901 Continued

kodachrome scenes depicting the property of FPC and had assembled a display portraying many resources of Florida and some of the products produced in the company's territory. The talk by Mr. Higgins, added to the unique way of presenting the story, proved very effective." The following excerpts from the February 21 issue of *Investment Dealers Digest:* "Representatives of many underwriters foregathered at the Company's office at the appointed time. The show was grand — all the more so for its unexpectedness and originality. In a room with the walls decorated with interesting pictures and exhibits demonstrating Florida's growing industries, a two-hour projection of colored moving pictures and stills, with informal and interesting comments accompanying it, made a splendid impression. Juice of Florida oranges was passed around during the performance, and at the end visitors were offered bags of oranges to take home 'to the children.' "

Fred Sexton, President of the Nova Scotia Technical College and regional director for Nova Scotia of the war emergency training program, writes: "I know you have a passion for accuracy as well as wanting news. You may add the degrees of D.Sc. and LL.D. to my S.B. In June, 1943, I was mentioned in the King's Birthday Honor List and awarded the rank of Commander, Order of the British Empire, giving me the right to use the letters C.B.E. after my name. In February I received the Julian C. Smith Medal from the Engineering Institute of Canada for 'achievement in the development of Canada.' We have started the rehabilitation training and the civil establishment of demobilized veterans and this promises to develop rapidly as the war draws to victory and afterwards. Until this policy is fairly well organized, I shall not be able to advise you to report me as 'retired.' " — Anthony Peters is now with the United States Engineer Corps, Park Square Building, Boston. He says: "In June of 1943 I arranged a leave of absence for the duration, and took up the above job, thinking that my engineering training might be of some use to the war effort. I gave myself a 'refresher' course of four to five hours' study a night for six weeks. I hadn't done any engineering work for some time, and I was surprised at how readily it came back to me — the Institute must have had what it takes, even then."

A note from William M. Vermilye says: "Perhaps it would interest some of my classmates to know that I am retiring from the National City Bank as of April 30 and am going to spend the rest of my life trying to advise people in regard to business management and labor relations. All of my life prior to the time I spent with the bank was spent in industrial management, and this is the thing I know more about than anything else." He has opened an office at 20 Exchange Place, Room 1734, New York City. — Willard Dow, certified public accountant, resigned from the Ordnance Department last November and has returned to the practice of public accounting as a member of the organization of Charles F. Rittenhouse and Company, Boston. — Henry Chambers writes: "Word has just reached me that good old Bob Derby is now in Australia. His address is 287 Collins Street, Melbourne, Australia. I am sure that he is having an interesting and worthwhile experience of which we shall learn some day."

In response to the annual class letter, Mrs. Katharine Howe Brownell writes: "May I inform you that on July 27, 1943, my husband, John R. Brownell, passed on with a heart attack. We have four children: Randolph H. of Mt. Kisco, N.Y.; Donald H. of Wyndmoor, Pa.; Marion B. Morrison of Arlington, Va., and John R., Jr., of Telford, Pa.; also nine grandchildren. I note that Roy Bolster, who was John's very good friend, passed on [September 8] within a very few weeks of John's death." At my request Mrs. Brownell also gave me the following facts. From 1901 to 1913 John was a safety engineer at the Penn Steel Company at Steelton, Pa. He then, in 1914, became superintendent of safety for the Industrial Accident Commission for the state of California, and while there headed a committee who formulated all the original safety laws for the state of California. In 1920 he went with the Equitable Life Assurance Society, first as a safety engineer, later as an insurance broker. — V. Frank Holmes writes: "O. H. Perry, Jr., who was a roommate and fraternity brother of mine, died a long while ago. I don't remember the year. He was ill on and off for several years." He has been listed as "not affiliated" for some time.

I was glad to receive a note from George Shute, X, of Columbus, Ohio, who says that he has been out of touch with the Class for many years. He was a captain in the Construction Division in the first world war, and when he came out, took over with others a selling organization under the name of the Shute Company, which became insolvent in 1932. In 1935 he qualified and was registered as a Professional Engineer in the division of chemical engineering. He belongs to the Professional Engineers in the national, state of Ohio, and local organizations. In the last few years he has had a year and a half of factory experience in ceramics and two short courses of study in ceramics at the Ohio State University. At present he has a temporary job in a legal and auditing department.

Ellis Lawrence now has his son, H. Abbott Lawrence, M.S., '32 associated with him in the firm of Lawrence and Lawrence, architects, Portland, Ore. Ellis is serving on postwar committees, the American Institute of Architects, and as honorary president of the Oregon Building Congress. He is also doing some writing and has written a novel, and, by request, "Wanted! A Workable Mechanism for Efficient Democracy" for the Pan American bulletin. He says: "I should like to see old classmates. The latchstring is always out for them."

Frank Dillman Rash of Louisville, Ky., writes: "After 25 to 30 years in coal mining and consulting engineering, I planned to retire. However, since 1926 I have served as president of a river transportation company; as original or first manager of the Louisville office of the Reconstruction Finance Corporation; as president of the Federal Land Bank, and manager of the Louisville branch of the Federal Reserve Bank. And now, since October, 1940, I have been state director of the selective service system, perhaps one of the most intriguing and interesting experiences of my life. I have maintained an interest in National Defense since 1904, completing National Guard service in 1936 as colonel of a regiment of infantry. For the past 20 years I have served as civilian aide to the Secretary of War. My son, Dillman A. Rash, Princeton '30, is a lieutenant colonel serving overseas. His wife and three children (my granddaughters!) are keeping the home fires burning here in Louisville."—GUY C. PETERSON, *Secretary*, 788 Riverside Drive, New York 32, N.Y. THEODORE H. TAFT, *Assistant Secretary*, Room 3–266 M.I.T., Cambridge 39, Mass.

1902

Dan Patch announces that he has for the third time become a grandfather, through a son born to Austin A. and Zoa N. Patch at Lowell, Mass., April 17. This little brother to Patricia Elaine and Penelope Ann is named Douglas Austin Patch and weighed at birth 11 pounds, 2 ounces. Dan, along with The Review, has given permission to the Quaker Oats Company to use his picture of the Akron silos of that company, which formed the cover for the April, 1943, Review, in the newly established house organ of Quaker Oats.

Dan has lately been in Boston long enough to get acquainted with the home folks. He recently gave his talk, "Where Ancient Meets Modern," to an appreciative audience at the Caledonian Club. This talk is illustrated with stereopticon slides from his own pictures taken in Greece and Italy. He reports having talked over the telephone with Bob Whitney, who says he will try to get to the next '02 function pulled off in this neck of the woods. He also reports a conversation with Mrs. Ralph S. Franklin, who stated that Ralph, who has been seriously ill, is now improving.

After an interval of years, Arthur Hall called on your Secretary to renew our old friendship. Although near one another, we had not met for a long time. Arthur is no longer with the Priscilla Cleaning Company, but is still around Boston, with 55 Washington Park, Newton, Mass., as his home address. He promises to try to get out to more of the class gatherings, and we shall hold him to his promise — and Whitney likewise. — BURTON G. PHILBRICK, *Secretary*, 246 Stuart Street, Boston 16, Mass.

1903

Just after our notes for the last issue of The Review had gone in, we received letters from Ancona telling us of the death of Palmer, and from Regestein telling of the marriage of Bradshaw.

Virgil M. Palmer, II, died in Rochester, N.Y., on February 16. He had been with the Eastman Kodak Company since 1913, the previous ten years having been spent with Pope Manufacturing Company in the automobile department, the Smith Auto Company in Topeka, Kansas, the Selden Motor Company in Wilkes-Barre, Pa., and the United States Motor Company in New York City. He acquired a great deal of experience and was considered a pioneer in the field of automotive engineering and management. He was a member of many engineering societies, serving as president of several of them. He was also a 32d degree Mason and belonged to various Masonic bodies. At the time of his death he was superintendent of the industrial engineering department at Eastman Kodak Company's

1903 Continued

Kodak Park. He is survived by his widow, two sons, and a brother.

Bradshaw's marriage was a complete surprise to Regestein, whose place adjoins the bride's property. George married Mrs. Cesare A. Protto of Westover Hills, Del., early in February. Congratulations! Regestein's oldest daughter, Virginia, was married to William A. Shakleford last September.

We have also received notice of the death of John W. Calnan in Durham, N.H., on March 9. After graduation, Calnan taught chemistry at Franklin Institute for 15 years, being head of the department. Later he taught at Lehigh, M.I.T., Phillips Academy, Norwich University, and recently at the University of New Hampshire. He leaves his wife, a daughter, a son, and two sisters. — FREDERICK A. EUSTIS, *Secretary*, 131 State Street, Boston 9, Mass. JAMES A. CUSHMAN, *Assistant Secretary*, 441 Stuart Street, Boston 16, Mass.

1905

You were undoubtedly mystified for the moment by the '05 news items which you received along with your ballot from the Alumni Office in the latter part of March. Most of you probably soon tumbled to the fact that it was a campaign stunt pulled by our new Class Agent for the Fund campaign, Grafton B. Perkins, V, Vice-president and advertising manager for Lever Brothers. The results obtained from this spectacular bit of promotional work, however, were all to the good and helped out not only the Fund total, but to make the class standing much more respectable. If you haven't responded with your 1944 addition to the Fund, do it now. Perk's address is 50 Memorial Drive, Cambridge, Mass. He writes: "My older son (Annapolis '34) has been back in service nearly two years. His letters are so superdiscreet that I can only be sure he is navigation officer on some good-sized ship now in the Pacific. And I suspect that the ship is some part of an amphibian force. Beyond this his latest letter reveals, very cautiously, that his ship has been somewhere and done something, and is now back somewhere else, doing nothing. All very hush-hush and regular Navy! He has one daughter. My younger son (Harvard '43) is an aviation cadet at Yale, hoping to have his bars long before these items see the light of publicity. My son-in-law is a lieutenant, junior grade, in the Navy, reputedly training for antisubmarine duty. His family 'stock-pile' consists of three sons. My younger daughter will be graduated from prep school this year, with her 'short-term' future (and 'long-term' ditto) entirely uncrystallized."

Arthur T. Hooven, Arcata, Calif., claims to be the only farmer in the Class. That may be a matter of definition, and we may have arguments from Ray Bell, Grove Marcy, P. G. Hill, and others, but listen to Art: "Farming has been very good to me, and I have been quite successful in producing parent seed-potato stock for the Kern County early potato deal. I have been located here among the beautiful California redwoods for the last 23 years. I have so many deer on my ranch that they are a pest, and I have to build high fences against them to protect cultivated crops. Sounds like a lot of baloney, but it is true. I have just the one son, Julius. He is a lieutenant, junior grade, in the Naval Reserve. As he is the only child I have, I feel that I must blow a little about him. In spite of Dad's pressure upon him to take a college course that had a healthy helping of exact science, he preferred to major in speech art and learn to peddle the good old bull. He is Stanford '36. When the disturbance occurred, he enlisted in the Naval Reserve. It was suggested that he go to officers' training school. He called attention to the fact that he lacked a suitable mathematical background. However, he had fooled around with sailboats a lot and on the strength of that got seaman, first class, rating. Apparently his farm training made up for his sissy college course, for he was soon upped to ensign, later to lieutenant, junior grade, and is now squadron commander of a fleet of crash boats, somewhere on the wave. Excuse Papa's pride, but when you have only one, it takes on a concentrated form." Perhaps his classmate, H. S. Bailey, king of California orange juicers, will claim he is a farmer. Here's a chance to prove claims to the title of Class Farmer.

Ralph E. Tarbett, XI, has not reported very often, but in a recent letter he brings himself up to date as follows: "In looking over the class news in The Review I had begun to think that I was, perhaps, the granddad-est one of the Class. The news in the February issue, however, indicates that I am only in the also-ran class, as I have only seven. I can compete with Mackie on one score, as I have five children, four boys and one girl, and all married. Since I cannot offer too much competition in the grandfather class, I can, perhaps, in another way. All four of my sons, as well as my son-in-law, are in the Army, and the old man, a commissioned officer in the Public Health Service, is also in uniform. As for myself, there is nothing particularly exciting. I am rounding out 31 years in the Public Health Service, with less than three years to go before I have to put 'retired' after my title. For several years now I have been stationed in Washington, and I presume that the powers that be will let me stay here for the balance of my service — never can tell, though."

Bill Motter wishes a correction in the April news items. He is not Roy Allen's boss, and he had absolutely nothing to do with the story of Roy Allen's project in Chile. That story came to us in a letter which Roy wrote Charlie Johnston, and Charlie Johnston sent our way, because it was so newsy. Our apologies to Bill and to the "state of the Nation," if we unwittingly published war secrets. Roy Lovejoy, IX, in writing me of a proposed trip to his New Orleans factory, fears that we will think he is off to the races. He says: "At the present time, although you may think that I am just going on a pleasure jaunt, I assure you that I am plenty busy. We are manufacturers of an extremely essential product even under normal conditions, and under the present setup, if it were not for our material, there would be a great many very, very serious shortages in getting out things that are necessary to help win this war, and it would be plenty hard for the boys over there to carry on if it were not for the machine knife that enters into the proposition at the beginning."

As a result of an appeal to business friends in Lima, Ohio, we have a little more of a story in regard to the death of Jules Barnd, III. Barnd had operated a real-estate office in Lima for a number of years. He had had some heart trouble and went out on the day of his death to look over a subdivision which he was opening up. When he did not return to his home at night, a search found that he had succumbed while at work. Mrs. Barnd is carrying on the business at 204 Faurot Building Lima, Ohio.

Morris H. Whitehouse, IV, passed away in Portland, Ore., on April 4. We have a volume of clippings from local papers, perhaps the most comprehensive of which is from the *Oregonian* of April 5, as follows: "Morris H. Whitehouse, 66, internationally known Portland architect, who died at St. Vincent's hospital Tuesday morning, following a heart attack after an illness of two weeks, was actively engaged in his profession up to the time he went to the hospital. He was the senior member of Whitehouse & Church and designed many of Oregon's outstanding buildings. In 1908 he began the practice of architecture in Portland, after graduating from Mass. Inst. of Tech. and studying in Rome. He married Mildred Fuller Anderson of Portland in 1936. From 1919 to 1931 Mr. Whitehouse was a member of the Oregon State Board of Architects. He was a member of the American Institute of Architects. Many of Oregon's most beautiful buildings were designed by him. He was associate architect in the designing and construction of such Portland buildings as Temple Beth Israel; Sixth Church of Christ, Scientist; Federal Courthouse; Lincoln and Jefferson high schools; Multnomah Athletic club and Multnomah Stadium; University club; Waverley Country club. He was also associate architect in the erection of the state capitol and the state library and office building at Salem. Among offices held by him was that of president of the Oregon chapter of the American Institute of Architects. He was a member of the Multnomah Athletic club, Arlington club, Aero club, Portland Golf club. Lodge affiliations included membership in the Masons and the Shrine. The Whitehouse home is at 2562 N.W. Mildred Street. Survivors include the widow and three sisters, Mrs. E. L. Brown, 2522 N.W. Johnson Street; Mrs. Edward Cookingham, 718 King's Court, and Mrs. H. S. Hostetter, Los Gatos, Calif."

We should like to quote further an editorial from the same paper, which those who knew Morris best can appreciate: "There are many monuments to Morris H. Whitehouse, architect, and these are the buildings he designed, among them the Temple Beth Israel. So long as this edifice stands, there will be gratitude without creed, other than that of beauty, that an architect dreamed and wrought so compellingly. Every building of his design in this city testifies to Mr. Whitehouse's fidelity to the ideal, to dignity of structure and beauty of line, for he was an uncommon architect honored among the most distinguished of his calling. Will Portland miss him? Sir, he is here, even now that he has gone, and many a thought in the future shall more happily paraphrase one of Kipling's greatest lines: 'After me cometh a builder; tell him, I too have known.' It was the exceeding good fortune of the city and state that Mr. Whitehouse followed his profession in this, his birthplace, and lived

1905 Continued

his life here, and lived it so well indeed, and so faithfully, that his work is his memorial, and shall be so a century and more from now. The dreamer and craftsman passes — to the presence of the Great Architect — but his testimony remains in the dream fulfilled and told in stone." FRED W. GOLDTHWAIT, *Secretary*, 274 Franklin Street, Boston 10, Mass. SIDNEY T. STRICKLAND, *Assistant Secretary*, 71 Newbury Street, Boston 16, Mass.

1907

A clipping from the Newark, N.J., *Call* of February 27 shows a picture of Allan Cullimore in connection with a feature heading, "Since my last birthday," with the explanation that each week the Sunday *Call* asks a birthday celebrant what the last year has meant to him. Allan said that the biggest thing in the previous year for him was a fishing trip in the summer of 1943, when he had the best fishing of his life at Loughborough Lake, north of Kingston, Ontario. He said: "Casting with a 4½-ounce fly rod, I caught the limit of six small-mouth bass every day for eight days and also caught two great northern pike, each weighing more than seven pounds." This will interest you '07 fishermen. Allan, as you know, is president of Newark College of Engineering.

Jack Kinnear has a son who evidently is following in his footsteps in that he was graduated from Technology (Class of '38) and in that he is making good in mining engineering. According to word kindly sent me by Charles E Locke '96, John C. Kinnear, Jr., has been promoted to assistant smelter superintendent for the Chino Mines division of the Kennecott Copper Corporation at Hurley, N.M.

And that, fellows, is all I have to offer you in this issue, the most meager set of class notes for years. I hope for more next time. — BRYANT NICHOLS, *Secretary*, 23 Leland Road, Whitinsville, Mass. HAROLD S. WONSON, *Assistant Secretary*, Commonwealth Shoe and Leather Company, Whitman, Mass.

1909

Don't forget the 35th reunion, or get-together, that is to be held at the Griswold Hotel, New London, on Saturday and Sunday, June 10 and 11. Feel free to come whether or not a return post card has been used. Ladies are welcome. Don't forget the pleasure that we have always had in just meeting old classmates and talking over events past and present, and in addition there are golf, boating, and swimming.

The following appeared in the Washington, D.C., *Herald:* "Quite possibly this stern, professorish-looking man stepped on the streetcar or the bus you were riding the other day. You noticed with surprise and interest the way the motorman gave this quietly dressed passenger his best smile and said: 'Good-day, Mr. Merrill, how are you today?' You thought, why he must be someone really important who's been a passenger of long standing on this line to rate such attention. You were right. The man you saw was the motorman's boss — Edward D. Merrill, [I], president of the Capital Transit Company." Ed is president of the American Transit Association, and of the District of Columbia Red Cross, and a director of the Travelers Aid.

Recently Charles E. Wilson announced the membership of the new automobile industry advisory committee which is made up of 17 automobile executives representing 9 companies normally engaged in producing passenger cars. Among the 17 is B. Edward Hutchinson, III, Vice-president of the Chrysler Corporation.

For a number of years Albert Thornley, II, one of the proprietors of the Narragansett Machine Company, has been supplying a number of us, at a liberal discount, with Narragansett "live wood" tennis rackets, and the Review Secretary can recommend them very highly. In normal times the company makes athletic accessories such as lockers, portable bleachers, and so on. He states that the company is out of the tennis racket "racket" and goes on to say: "As far as news about myself is concerned, about all I can say is that I'm in war work up to the neck. My son is at officers' training school at Yale, after spending nearly two years in the service in different parts of this country. My daughter and her dog are at home with us, as her husband is in the Mediterranean theatre. And by the way, that dog is some dog — in fact a whole team of dogs! And we have one of our own besides."

Bob Doane writes that he has left the Navy in Washington and is back at his old job with Anaconda at Hastings-on-Hudson. He makes the following statement: "I am back at my old desk and am very, very happy at the change. Now I can begin really to earn my salary and, I think, do something more worth while in the furtherance of our common war effort."

In The Review for April, under the caption, "M.I.T. Men at War," there is mention of both Scharffs: Dad Molly and Son Samuel. Both have their new ranks published: CO-lonel Molly and CO-rporal Samuel. Samuel is in the Air Forces far away overseas on a technical mission. I never think of Samuel without recalling how often we stopped on the way over to the steamer at Fall River from Oyster Harbors in, I'd say, 1934. The Scharffs took me in their car, and we had to make those many halts to provide Sam with a huge quota of fried clams! In my heart, that long, lean, delightful rascal has ever since been the Fried Clam Kid! Molly and Jeanne are still in Washington.

Mex Weill, II, had the misfortune, on March 24, to have a disastrous fire at his plant, Skydyne, Inc., at Port Jervis, N.Y., where he has been making plywood for airplane fuselage. It was a tough blow for Mex and his son, Bob, as well as for the rest of the family and the town. A letter from Helen, Mex's wife, tells of the magnificent co-operation of the townspeople in trying to get the plant into operation again. That's something not to be wondered at when you know Mex and Helen and Bob.

Early in March Paul slipped in the snow and broke the fibular bone in his ankle and for some time was "housed up." He was discharged by the doctor early in April and was quite delighted, because for the first time in his life he was able to collect some payments on an ancient policy that had been in force for years. He writes as follows: "I met Chet Pope in the Lackawanna Station in Hoboken last night. I asked him whether he had any feeling about the putting off of the reunion. 'No,' said he, 'I could not have come anyway.' He had with him his stepson, Philip, a fine boy who was always a little fellow to me. And here he was an upstanding youth and Chet told me had had all his physicals for the Marines and would be called soon! What a boy he must be! — PAUL M. WISWALL, *Secretary*, 90 Hillside Avenue, Glen Ridge, N.J. CHESTER L. DAWES, *Review Secretary*, Pierce Hall, Harvard University, Cambridge 38, Mass. *Assistant Secretaries:* MAURICE R. SCHARFF, 3860 Rodman Street, Northwest, Washington 16, D.C.; GEORGE E. WALLIS, 1606 Hinman Avenue, Evanston, Ill.

1910

Your Secretary again sadly reports the passing of two of our classmates, Lewis W. Waters and Robert L. Dodge. The only information of Robert Dodge is that he passed away on April 4 and was living in Highland Park, Upper Darby, Pa.

Lewis Waters had just been nominated to serve on the Technology Corporation where he would have been of great value to the Institute. The following is taken from the New York *Herald Tribune:* "Lewis W. Waters, vice-president in charge of scientific relations for the General Foods Corporation, died yesterday [March 31] at the Columbia-Presbyterian Medical Center. He had suffered a heart attack Thursday evening soon after leaving his office at 250 Park Avenue. He was fifty-five years old, and lived at 80 Hartsdale Road, White Plains. As vice-president in charge of research and development from 1930 until May, 1943, Mr. Waters was influential in the development of dehydrated and compressed foods, the packaging of frozen foods and the enrichment of cereals with vitamins. After he was placed in charge of scientific relations his chief work was the adaptation of scientific nutritional advances to the food industry. Mr. Waters was a member of the council of the American Chemical Society and a member of the Institute of Food Technologists, the Society of Chemical Industry, the American Public Health Association, American Institute, American Association for the Advancement of Science, and the committee on scientific research of the National Association of Manufacturers. He was a member of the National Research Council from 1939 to 1941. He was a consultant of the scientific committee of the War Production Board and a member of the advisory committee on research and development of the office of the quartermaster general. Surviving are his wife, Mrs. Hazel Rugen Waters; a daughter, Miss Sally Waters, and a son, Lewis W. Waters, Jr."

The following is from *Marine Progress:* "The Cramp Shipbuilding Company has announced the appointment of Karl D. Fernstrom as vice president in charge of production. Mr. Fernstrom has been associated with a number of nationally known companies since his graduation from Massachusetts Institute of Technology in 1910. Some of these companies are: Fairbanks, Morse & Company, Columbia Plate Glass Company and Newport News Shipbuilding & Dry Dock Company. He went with the latter firm during World War I. In 1941 he was made vice president and general manager of the North Carolina Shipbuilding Company and more recently has been general manager of the operating division for the distribution of synthetic

1910 Continued

and natural rubber. The Maritime Commission requested that Mr. Fernstrom be made chief operating officer of the Harrisburg Machinery Company and the Springfield Foundry and Machine Company to operate them while a contract for Liberty ship engines was completed. The Cramp position was created for him and in it he will have complete responsibility for all matters pertaining to production."

Carroll Benton, who is with the Telephone Company in New York City, sent your Secretary a short note, together with a clipping, in regard to Lewis Waters. He seems rather optimistic on the war when he wants to know about the prospects of a 35th class reunion next year. — HERBERT S. CLEVERDON, *Secretary*, 117 Grant Avenue, Newton Centre 59, Mass.

1911

Truly like a bolt from the blue came the news over a Boston radio station in late April of the death of our beloved first marshal, Ted Parker, I, lately head of the Institute's Department of Civil Engineering. Letters of Don Stevens' and mine crossed the next day, and in his was a grand tribute which rightly stands as 1911's epitaph to Theodore Bissell Parker, man among men. The Institute Gazette section of this Review contains the story of Ted's career. Don Stevens' moving letter, which speaks for all 1911 men, follows:

"Ted Parker was our first marshal, and his passing is more than just a shock to us. If there was any one man in the Class who represented a composite picture of what all members of the Class would like to be, Ted was that man. It was not by mere chance that he was elected first marshal. Ted Parker was a straightforward man who did not wear his ideals on his sleeve. Everyone in the Class knew that his integrity was unusual, that his judgment was sound, and that his friendship and guidance were available to all. These characteristics stayed with him throughout his life wherever he went, and they will stand out in our memories even more than his fine ability as an athlete and his one hundred per cent leadership in class and Institute affairs. Most of us did not realize that Ted could be ill. We thought of him as possessing perpetual strength. Few of us knew that his health was in danger until the newspapers told the story of his passing. 1911 had in Ted Parker a man who was first marshal not only in title but in fact and in deed. This was true in this world, and we feel that it must be true in the world to come."

Hats off to Bill Orchard, XI, "outstanding citizen of the Oranges and Maplewood, N.J. for 1943!" According to a clipping from the Newark Evening *News*, thoughtfully sent to me by Cac Clarke, Assistant Secretary of 1921, the Chamber of Commerce and Civics of the Oranges and Maplewood thus recently honored our Bill, who resides in Maplewood. Commenting, the paper says: "Orchard, general chairman of Wallace & Tiernan, Inc., of Belleville, was an outstanding figure last year in organizing industrial facilities to mesh with efforts of the WMC in combating problems of labor shortages at war plants. Chambers of Commerce and various employer associations were rallied, the manpower mobilization committee was formed and Orchard was made chairman. Ensuing efforts to keep the Newark area from being named 'critical' by WMC were hailed as successful in late January by WMC Executive Director L. A. Appley. Orchard's leadership was cited by Appley. A resident of Maplewood for 25 years, Orchard helped found and is president of the Maplewood Citizens' Committee. He helped establish the Maplewood Citizens' Budget Committee. He is treasurer of Maplewood Community Service and is chairman of the Maplewood Planning Committee and a former president of the Maplewood Civic Association." Pretty fine, eh?

Failing to survive an attack of pneumonia, Clayton S. Robinson, II, died at his home in Brockton, Mass., on March 10. For many years, he had been manager of the Firestone tire plant in Brockton and later with General Tire Company, but shortly after the start of World War II he entered defense work in Attleboro and later was made supervisor at the Bethlehem-Hingham plant. We had the pleasure of having him with us at our 30th reunion in Plymouth three years ago. He was married to Ava Phinney of Kingston, Mass., 31 years since, and besides his wife he leaves a daughter, Elizabeth, who teaches in Needham, and a son, G. Elliott Robinson of Buffalo, N.Y. Recounting his fine accomplishments in Rotary, during ten years' membership prior to entering war work, the Brockton Rotary Club newsletter of March 13 continues: "Bob looked forward eagerly to the day when he could return to his Rotary Club and the friends there, whose respect and affection for him never changed. His hope and desire cannot be realized, but he will continue to be with us in memories of hours happily spent and work well done, even though he has gone to fields beyond our human knowing. So we bid farewell to this loyal friend and good citizen, who in countless ways built himself into the community life. His influence will live on."

In *Time* for April 24, in a story entitled "The MacArthur Candidacy," occurred this passage: "Lukewarm toward air power before War II, he changed his mind quick to work hand in glove with his air chief, Lieut. General George C. Kenney [II], one of the most brilliant developers of air warfare."

On a recent business trip through Orange, Mass., I saw Warren Simonds, I, chief engineer of the Rodney Hunt Machine Company, where he has been employed for more than 25 years. He and his wife are "back where they started," he said, "rattling around in a 14-room house." Their oldest girl, Phyllis, is in library work in Providence, R.I.; their son, James, a staff sergeant in the Army; the two younger girls, Katherine and Ann, are both in Worcester working for Norton Company; the former, as secretary to the company treasurer; the latter, in the publicity department.

In a recent letter, John Alter, IV, practicing architect in Lawrence, Mass., said he regretted we had had no 1911 Boston dinner last fall on the 7th day of the 11th month and mentioned that R. T. Walker, "our most famous 1911 architect," gave a fine talk at the Boston Architectural Club in early April. — From Chicago came a letter from John L. Wilds, II, President and Treasurer of Protection Mutual Fire Insurance Company, saying they had been delighted out there to have a recent visit from O. W. Stewart, I, Boston executive of Factory Mutuals, and reporting that at the dinner for President Compton in Chicago on March 28 "we had a swell turnout of Alumni, and at our table were Stanley Bates, I, Jim Duffy, VI, Walter Hildebrand, I, Armand Peycke, II, and Don Williamson '10."

My wife, Sara, and I certainly appreciate the numerous expressions of good will that reached her during her stay of more than a month at Worcester City Hospital, following a serious operation and ensuing complications. — One address change to close: Alanson L. Palmer, V, has moved from New Port Richey to 516 Bay Street, Tampa 7, Fla. — Have you sent in your subscription to Alumni Fund V yet? If not, so do! — ORVILLE B. DENISON, *Secretary*, 82 Elm Street, Worcester 2, Mass. JOHN A. HERLIHY, *Assistant Secretary*, 588 Riverside Avenue, Medford 55, Mass.

1913

"How about striving for an average of $31 each, in commemoration of our 31st anniversary?" That is the question that Larry Hart asks as class chairman for the Alumni Fund, and he deserves a favorable answer. Please give five dollars more than you did last year. We had 155 contributions in 1942–43. We need a minimum of $21 each from no less than 155 to fill our quota of $3,340. Let us be able to hold up our heads among the classes of our time.

Larry Hart's letter of March 9, contained sad news: "You will be very much shocked and extremely sorry to learn that our old friend, William DeYoung Kay (Bill Katsenberger) passed away in New Orleans on January 31, 1944. I have just received a letter from his widow asking that I notify the proper persons in connection with Institute activities concerning his death. Mrs. Kay gave me some information which you will want to include in the next issue of The Review under the class notes. Bill was treasurer of the Lane Cotton Mills Company, New Orleans; he was also a member for many years of the New York Stock Exchange, the American Institute of Electrical Engineers, the Louisiana Engineering Society, and the Society of the War of 1812. I have not seen Bill for several years and have had only infrequent contact with him. I did not know that he was ill, and Mrs. Kay's letter of March 4, gives me no details of his death."

It is a pleasure to have notes from the following: Burton L. Cushing, II, who writes: "I am still head of the Science Department of the East Boston High School. I wrote the text, *Fundamentals of Machines*, published by Ginn and Company in 1943. The book follows an outline by the United States Army for use in pre-induction classes. I am conducting a course in "physics for teachers" — an Engineering Science and Management War Training course sponsored by the government at the Harvard Graduate School of Education. I am working with Ed Cameron'13 at Jackson and Moreland, engineers, Boston, Mass., on Navy contract part time." — George H. Starr, I: "Here's my dollar. I've been waiting for something to happen, but it

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hasn't occurred yet — at least I'm still alive. As for 'doings,' I am working with John Hession, and he suspects they are negligible. As to whereabouts, they are anywhere the work is."

Alex Pastene, X: "The Treasury has stayed dry a long time, for all of me. But I am tidy, sort of, and saved your request for a later day — so here it is with my small contribution. I am operating a section of the St. Louis plant of Monsanto Chemical Company. I am busy up over the ears, as I know all the rest of us are, each in his duties. And we don't write much, for to most of us, next to the war, our own affairs are pretty completely engrossing. I have had a hand in some smaller war projects. They made good, I am happy to boast, and of course, anything for which the War Production Board will release raw materials by allocation is considered important enough to keep going. Our products are wanted and very widely used in the war effort, if not actually at the front. One son is in the service, as a Naval Reserve lieutenant, junior grade, long stationed at Balboa, C.Z. — from my point of view, a lucky circumstance — from his, a bore. The St. Louis alumni group holds occasional meetings, but not very frequently. This year I undertook to pilot them, and we are open to speakers of renown — want to offer? The last one was Professor Prescott, a very enjoyable soul. I don't see many '13 men here, only Phil Barnes with his glass-lined stuff, occasionally. I should welcome others if they were to pass this way, even though I give the impression of having lots to do. It's a pose. Anyhow, good wishes to you and others you greet."

Earle Caldwell, X: "Here's some news, if you think you can survive the shock. For the past few years I have not been receiving the Technology Review. Why? Because I have been derelict in my duty by not contributing to the Alumni Fund. I kept putting it off, but got around to it at last and sent that check. All this is preliminary to saying that I have just received five copies of The Review, and what a grand and glorious feeling it was! Naturally, the first thing I turned to was the 1913 class notes, my interest being primarily in what my classmates were doing. When I found some '13 notes I was elated, but when they were missing, I was disappointed. If you don't get the news, you can't put it in, can you, Fred?" So far so good, but as you, Earle, were interested in what others were doing, perhaps someone will be interested in what you have been doing. "What I write about myself, Fred, is old stuff to me, and it seems quite uninteresting, but perhaps — and I am a hopeful cuss — it may interest some of the others. I seem to have sold myself on the idea of writing you, Fred, and having never suffered from a lack of modesty (1913 never did either), I recommend the idea as a splendid one for a few of the other retiring souls to adopt, and sell themselves as I did and am doing.

"I have been here in Florence, a part of Northampton, Mass., with the Florence Casket Company for over 25 years, as treasurer, director, part owner, etc., etc. The et cetera's stand for the fact that there is hardly a job in the business in which I have not served. My concern has to do chiefly with woodworking, and if you think metals are scarce, try to get some lumber. It is a small, closely-held concern which has been successful for almost 75 years. It has been an unexciting life, but withal a happy one. I have served in several offices in the industry as a whole, such as on the executive committee of the national association, and as New England representative on the Code Authority in the old days of the National Recovery Administration. At the present time I am president of the New England Casket credit bureau. When you say you are in the casket business, it always draws a smile, but nevertheless it is an essential industry and a successful one. I have been a Rotarian and active in Masonic circles, both local and state. So much for my job and me. I have managed to raise two daughters. The elder was graduated from Middlebury College, received her master of arts degree from Smith in geology, and at present is with the Shell Oil Company in Houston, Texas, as micropaleontologist. (Parsons, Brewer, and Horsch, beware.) The younger was graduated from Green Mountain Junior College and Northampton Commercial College, is married, but still working as private secretary at the Smith alumnae office. I have seen very few of the old gang since the 25th reunion. And what a reunion that was too! A year or two ago, I went down to Springfield to visit one of those trains which the Office of Production Management was sending around the country. (Remember those days when we were all looking for more work for our shops to do — even the casket manufacturers wanted it!) The first one I ran into was George Forrester, who was with the Office of Production Management as chief engineer for Connecticut. I visited him in Hartford after that, but don't know where he is now. He looked just the same old George as ever. I was in Cincinnati about a year ago and gave Norm Clark a ring. Talking with his wife, I found out that he was working in New Jersey. Parsons and I had a short visit quite a while back when I ran into him in the Hotel Northampton. He was with his wife, entering his daughter in Smith.

"There, Fred, is a little news; use as much as you wish or as little. As I read it over, I feel funny about writing and tooting my own horn, but that seems to be the only thing to do if I have to send you some news. To reiterate my point. I once remonstrated with a local reporter about some little thing he had put in the local paper about me. His reply was, 'You like to read about others, and vice versa, they like to read about you.' I hope he was right that someone will be interested in this prosaic account of my doings. Best wishes, Fred, and if ever you have a class get-together in Boston, be sure to let me know, as I get down to the old town once or twice a month. Which reminds me, that I was in the Mural Room at the Hotel Kenmore a few weeks back, having a 'few' with some of my competitors. Among the crowd was a guest, a young lad in the Navy who was on his way from Portland to an unknown destination. For a few nights he was at the Brunswick, which is now being used as Navy barracks. He remarked what a dump it was. I couldn't let that pass and had to defend our old 'chapel.' Remember? It still served at the 25th."

William S. Crost, VI: "Sorry I have nothing of interest to send. I have tried to offer my services, but the government sets an age limit. I have been connected with the Office of Price Administration and air warden activities, and my wife has been very active in the Office of Civilian Defense, selling government bonds, and so on." — H. L. Shoub, VII: "I am stuck here in New York with a small one-man laboratory and have no opportunity to go anywhere to meet the boys. I hope that some day things will change. Meanwhile, so long, all." — C. F. Haglin, II: "In accordance with your request of October 13 I enclose one dollar for class dues. I am still doing what I have been doing since being graduated from the Institute, namely, operating a construction company in the Middle West. Since 1940, however, our company has been interested in a very considerably expanded program for the Army and Navy in construction work throughout the Middle and Far West, as well as in construction of the new Navy landing ship, tanks, at Evansville, Ind. This expanded program has resulted in a great deal of traveling on my part, and if you have had to make trips around the country in the last few months, you will realize that life has not been entirely a bed of roses. Practically 50 per cent of my time is devoted to inspecting work in Idaho, Utah, Arizona, Texas, and Indiana."

Ed Hurst, II: "Pursuant to your peremptory request of October 13, there is attached one dollar for class dues. I think you will agree with me that all 1913 men are very poor contributors to our class notes. There may be exceptions, but they are few and far between. Being quite as guilty as the others, I understand the reasons for the delinquencies. Fred, we are a close-knit class in spirit only. We certainly are not a close-knit class insofar as having intimate knowledge of one another's activities. I think this is a shame, and I think we are all to blame for our carelessness. It may be that collaboration during this terrestrial sojourn is not essential, but who is there among us who can give any assurance that collaboration in the hereafter might not be most helpful? Pretty soon, as Jumbo Mahoney expresses it, 'we shall be pushing up the daisies,' and then might it not be helpful to know the whereabouts of a 1913 man, whether the locale be one where coal is shoveled or one where the fair angels dance the rumba? Sir, my thesis is simply this: Knowledge may be power, but lack of knowledge of one's classmates is diabolical carelessness. As for my doings, I have been engaged on critical war work since Pearl Harbor, and our mutual Uncle Sam allocates to us all the essential materials we need without red tape and with remarkable efficiency. Therefore, he must need what we produce."

Allen Brewer, III: "If my Mid-Victorian typewriter holds out, maybe I can tell you some news. A lot of water has passed over the dam since I last wrote you. It has made many changes for us. I'm sorry to have to tell you I lost my wife last May. This happened just after we moved to our remodeled house at Avon, N.J. Until I had to go along without her, I never realized what a help she had been to me during the last 23 years. As our boys are fortunately all grown, my job with them is merely a steering job. My wife did a beautiful piece of work in training them from the start to be fine citizens. The eldest, Allen, Jr., was

1913 Continued

graduated from Yale University School of Fine Arts in September, 1942, and is now with a camouflage unit of the Army Engineers. Gordon, the middle boy, is at the University of Delaware studying chemical engineering, and John, the youngest, is still in high school. The old man is still with the Texas Company in technical service staff work. I shall have completed 25 years next June. Yet I can still cast a line in the surf with the best of them and still hold the family record for the largest striped bass. This year my biggest was a 22-pounder. Aside from fishing and keeping the home going, my time is well occupied in trying to keep a lot of war industry plants from getting into lubrication difficulties. Maybe I'll get to Pawtucket; if I do, I'll surely look you up for lunch."

Rhys North, IV: "Still plugging along at the Norfolk Navy Yard, as architect for the Department of Public Works — swimming pools, recreation buildings, auditoriums, and toilets. The Specialist has nothing on me. We have toilets for white men, white women, colored men, colored women, men officers, Wave officers, Wac officers, enlisted men, and enlisted women. The Navy is very democratic." — Vernon Kay, VI: "I am production manager for the Joseph and Feiss Company, Cleveland, Ohio. We are at present engaged in the manufacture of uniforms used by the Army and Navy." — Prescott Kelly, XI: "No changes, except that I now have three grandchildren. My son is a Navy ensign, running a PT boat. The Seabees turned me down as too old." — Major Karl Briel, I, is back in Boston, from Texas, and Major Walter Merrill, XI, is stationed in the Caribbean area. — FREDERICK D. MURDOCK, *Secretary*, Murdock Webbing Company, Box 784, Pawtucket, R.I.

1914

World War I found our Class out almost three years. At that time there was practically no reserve corps in either the Army or Navy. Our age group and training made us ideally suited for training and acceptance in the Army and Navy Reserves. The response was very great, and the result, more 1914 men paid the supreme sacrifice than those of any other class.

Now it seems again that we are in an age group where the sons and daughters of the Class are particularly eligible for military service. A check-up of the first 63 questionnaires to be returned in regard to the reunion shows that 33, or just over half of the members of 1914 reporting, have sons or daughters in the service. Although not actually asked for, quite a number of sons-in-law were also reported in the service. This list seemed so impressive that your Secretary decided, instead of preparing the usual class notes, of which there were practically none this month, to use this space to mention the sons and daughters of 1914 in the service.

Baxter's son is in the Army Specialized Training Program. Calver's daughter is in the Marine Corps Women's Reserve; Clisham's son is a lieutenant of Infantry out in the Pacific; Crocker has one son, a lieutenant of Ordnance and now overseas, and another son in the Army Specialized Training Program, stationed at the Institute. Danforth's son is a sound man on a mine sweeper. Dinsmore's son is a private of Infantry. One of Dorrance's sons is a lieutenant in the Air Forces.

Duff has three sons in the service: one, a captain of Field Artillery, another an air cadet, and the third in the Navy V-12 unit at Technology. Duffield's son is a lieutenant of Field Artillery. One of Eberhard's sons is in Officers Candidate School for a commission in the Engineers Corps. Fales' son is in the combat Engineers. Faunce's son is an ensign in the Navy, assigned as deck officer on a mine sweeper. Frank has a son who is a seaman, second class, in the Navy. Henry Gardner's son is a lieutenant in the Navy, assigned to maritime service. He has been on convoy duty all over the world, and his ship took part at Guadalcanal. Goeth has a son who is a private at the Ordnance school at Toledo.

Our two married classmates, Paul and Constance Howes, have two daughters in the Wacs one a lieutenant and the other a private, while their son is in the Navy. Key has a son who is a lieutenant in the Air Forces and recently was stationed in India. Lucas has a daughter in the Wacs and a son in the Navy V-12 unit at Iowa State. Morrison's son, who graduated from Technology, is a captain in the Antiaircraft Artillery; his other son is in the Air Forces, training to be a pilot.

Ober has a son who is a lieutenant in an Ordnance combat unit. Paul's son is an ensign in the Navy. Perry has a daughter who is a pharmacist's mate, second class, in the Waves. Reber's son is a corporal in the Army. Richmond's son is a lieutenant in the Air Forces. Ricker's son is a lieutenant in the Navy. Shaw has a son who is a pharmacist's mate, second class, in the Navy. Spitz's son is an ensign in the Navy and has been serving in the South Pacific. General Waitt's son is a private in the Army. One of Walton's sons is a lieutenant in the Air Forces, and another a staff sergeant in the Signal Corps.

Whitwell reports that his son is in a Navy V-12 unit, while one of his two daughters is married to a captain of Ordnance and the other to a lieutenant in the Air Forces, thus making his family one hundred per cent involved. Wicher's son is a captain of Infantry. C. H. Wilkins' son is a radio mechanic in the Army. Willis's son is a technical sergeant in the Air Forces.

When the other questionnaires are received, more data will be collected and will appear in another issue of these notes. — H. B. RICHMOND, *Secretary*, General Radio Company, 30 State Street, Cambridge 39, Mass. CHARLES P. FISKE, *Assistant Secretary*, 1775 Broadway, New York 19, N. Y.

1915

Keep those Alumni Fund checks rolling in. We've made a good start for this year, but you chaps now reading these notes are the ones who give regularly each year and on whom we must depend — so "help Azel" — make his job easy, and send in your check now. Read these interesting, amusing, friendly letters, all good, and all from good fellows!

Gabe Hilton, Buffalo, N.Y.: "Back in December, the M.I.T. Association of Buffalo held a dinner and offered the opportunity to see the Curtiss factory in operation. Ben Neal, Bill McEwen, and I got together and had a reunion all our own. We had a grand time and really saw how planes are built. I also met for the first time, believe it or not, a classmate, Nelson Stone. We have been having lunch at the Athletic Club at adjoining tables for years and never knew each other."

Lloyd Chellman, Washington, D.C.: "I received the letter bearing your usual cry of being broke, and also as usual I had my ego falsely inflated by finding that I am still on your sucker list. The enclosed check will, I hope, be of some use to the Class, in addition to paying for part of your customary carousing. . . . My first work in Washington was with the construction branch of the Office of Chief of Engineers of the War Department, where our group had charge of the construction of all munitions plants. When this job was practically completed in November, 1942, Mr. William M. Jeffers, the then newly appointed rubber director, requested and obtained Frank R. Creedon '18, together with his group, of which I was a part, to form a very small organization to have charge of the construction of all rubber plants. As you may know, the principal rubber program has to do with the production of Buna S, which, as you also probably know, is obtained by combining styrene and butadiene in a copolymer plant, out of which comes the Buna S rubber. My particular province was the construction of all styrene plants. In December, 1942, our mutual enemy, George Rooney, came into the organization, and it was a particularly happy day when he was assigned to my group. He, as always, did an excellent job, his principal worry being the construction of one of our larger plants near Pittsburgh. I was exceedingly sorry to have him leave us last August, but after talking it over we both agreed that it would be the part of wisdom for him to return to Boston. I am pleased to be able to say that all of the styrene plants are completed and in satisfactory production. Right now I am pinch-hitting in connection with a tire- and tube-manufacturing expansion program while waiting for an expected expansion of styrene plants. . . . So far as my personal life is concerned, I am still suffered to live with my one wife. My son, who has been in the Army Air Forces since November, 1942, was most recently heard from at a port of embarkation somewhere in the vicinity of New York, and we believe that he is now either en route or has arrived at some base on the other side. My daughter finished up at Colby College last May and almost immediately started in at the Boston School of Occupational Therapy, where she will be until the end of 1945. While at Colby she went and got herself engaged to a very nice lad, but no plans are being made for a wedding, as she has hopes of being able to be of some service to our disabled boys after she finishes her course. . . . Incidentally, I have just returned from a six weeks' vacation spent at home and in the hospital, where a bit of cutting up was found necessary."

Harold Colby, Milton, Mass.: "It has been some time since I have heard from you, and consequently I was quite pleased to receive your letter of January 10, even though it does have an appeal — for dues. Here's my check, and it's to be regretted that, having just made out a check for the Commonwealth of Massachusetts and one for our mutual friend, the Collector of

1915 Continued

Internal Revenue, to say nothing of the multitude of wartime demands, it isn't more. . . . Not much to say about myself or family personally except that we are busy, like everyone else. My daughter, Virginia, puts in six eight-hour days at the Army Base each week, and feels that although a civilian, she is doing her part in the war effort. My son, Walter, who has just reached his majority, has been in the Army for one year. He is an assistant engineer and waist gunner on a Liberator bomber, with the rank of sergeant in the Army Air Forces. He is now somewhere in the Pacific. My wife, Madeline, has her hands full keeping house for the rest of us, which, coupled with over two years of service with the Red Cross making 'this and that' for the boys in the service and the hundred and one other activities which they maintain, plus her church work, really keeps her out of mischief. As for yours truly, well 'he don' do nuthin' ' — oh yeah!"

Bill Tallman, New Bedford, Mass.: "I am still 'architecturing' in New Bedford, mostly postwar. The age barrier seems to have limited my war activity to civilian defense, plane spotting, and oil rationing, but I've had an excellent proxy in my son Humphrey, who flew from the *Hornet* throughout her very eventful life, and annexed a Navy Cross at Santa Cruz in the *Hornet's* last action. . . . I hear occasionally from Joe Wood '14, IV, who has done such excellent work with colored troops and is now brigadier general with an infantry division last heard from while getting a final polish in the Arizona desert." We're proud of Humphrey, too, Bill, and good luck to him!

Paul Weymouth, Holbrook, Mass.: "I have been with the Boston Quartermaster Depot as general laboratory chemist since November, 1935. When I first went to the Depot, it was for the purpose of food analysis, examining perishable foods bought for the United States Army and Civilian Conservation Corps in New England. The present situation has changed considerably. Food work is only a minor part of the inspection. I examine greases, leather, oils, soaps, insecticides, rubber, cements, glues, cloth, metals, and many other materials — anything that the Depot purchases. . . . All this I have attempted to do alone until the middle of this current month, when one man was given to me as assistant. I need eight or ten chemists."

Carl Dunn, Chicago: "I am active in consulting work on production problems. I see so much, however, of the current labor attitude that I am sick of it and more sick of the labor policies that have brought about the condition. . . . My daughter, married a year, is living in Georgia, and it makes a change in our interests and activities. . . . I hope to visit Boston and you during the present year."

Larry Bailey, Chestnut Hill, Pa. "Saw Gil Peakes and E. J Casselman over at the Chemical Show in New York last December. They seem to be fixtures in their respective jobs, just as I am a fixture at F. J. Stokes Machine Company. . . . I have been working on equipment for many war jobs, including rubber catalysts, atabrine, vitamins for bread, and recently penicillin. These were all Agricultural Adjustment Administration priority programs and kept us extra busy, as we were already loaded up with work for the various arsenals, navy yards, and signal corps. . . . I have one other bit of news: I've been a grandpop since last August. My son Robert, who is down in Buenos Aires, has a baby daughter. I shan't see her for the duration but have received some very nice pictures and she looks OK to me."

Bill Spencer, Baltimore: "I am sorry that pressure of work was such that I could not attend the New York meeting, but I am sure you had the usual enjoyable reunion. . . . We have been under pressure for over three years doing over 99 per cent vital war work. We were in the position of being 'damned if we did and damned if we didn't.' " Admiral Morrell, Chief of the Bureau of Yards and Docks, saw to it, however, that we were awarded the Army-Navy 'E', an honor few contractors achieved. We were also given the Treasury Department award for selling bonds. . . . Let us hope that by the time we are ready for our 30th reunion the war mess will be settled and we can all enjoy another short time together."

Bill Campbell, Berlin, N.H.: "I hope the Class will go over the top as usual, as the Institute is doing a fine job. . . . Give my best to any of the crowd when you see them."

Ben Neal, Lockport, N.Y.: "You are nothing but a low-down tax collector. Don't you know that we fellows out here in New York State have a state income tax to pay on April 15, plus a declaration and additional withholding tax to the Federal Government, when we haven't even recovered from the blow of March 15? And here you come along with your collection letter. What is the matter? Are you personally broke or something? And you a smart salesman! You let me be scared to death! Well, anyhow it isn't so bad as it sounds, and I have sent the Alumni Association a check. As the drive progresses, keep me posted as to how it is coming, and it will be a privilege to be in the group that puts it over the top, if you need some more later."

San Willis, New York City: "With the exception of a telephone chat with Sam Berkowitz and a very pleasant hour with Herb Anderson in Philadelphia several months ago, my contacts with the 1915 bunch have been nil. . . . My work has been confined to new methods, materials, and so on, designed to speed up the war program, and in this I have been modestly successful. The net results to me have been a few more gray hairs, and a few more dollars also, which between income taxes and renegotiations, will quickly be reclaimed by the great white father in Washington. . . . On the family front all is serene. My son is senior engineer of tooling and equipment at one of the Du Pont ordnance plants; my married daughter is living in the South until her husband, who is a pilot in the Transport Command, is shipped overseas; and the baby of the lot is a Spar and, from all accounts, having the time of her life. I have one grandchild a year old and another expected next month. . . . What, if any, plans are being made for our 30th reunion next year? Of course the war may still be going full blast, but I, for one, feel that I shall have earned a three-day layoff and would work the better for it. The location should be somewhere along the Connecticut shore to reduce transportation to a minimum, and please have it in the summer, regardless of when the powers that be decide to hold Commencement."

The foregoing letters are up-to-the-minute doings of the finest bunch of men in the country. They are happy to be alive and well and able to do whatever they can for their country.

Remember that Alumni Fund — and send in your check *now!*

It is sad to recall the passing of our classmate, John Sharp Williams 3d, who died in Jackson, Miss., on January 29 after a short illness. Before coming to Technology he attended the University of the South. He spent the greater part of his business life as an insurance agent. He was president of the Mississippi Association of Insurance Agents two terms and national councilor five terms, also executive secretary for a short time. He was chairman of the State Insurance Commission of Mississippi for four years. To his family go the sympathetic feelings of our Class for their sad loss. — AZEL W. MACK, *Secretary*, 40 St. Paul Street, Brookline 46, Mass.

1917

The New York 1917 Luncheon Committee, initiated by our worthy President, Win McNeill, sends formal word of a monthly luncheon to be held on the third Wednesday of every month. The gathering is at the Technology Club, 24 East 39th Street, New York, and members of 1917 are welcomed and hoped for whether or not they are members of the club. Because of rationing complications it would be helpful if the resident manager, Mr. Patterson, were notified by card or telephone (CA 5-7424), but the probability is that an occasional out-of-town visitor can be taken care of on short notice or no notice at all, if he suddenly finds it possible to join the group. The dining room is open between twelve noon and two o'clock.

From the first meeting in January we have the following official report. In attendance were: A. Raymond Brooks, Carl M. Gilt, William B. Hunter, Kenneth M. Lane, W. Joseph Littlefield, Benjamin Levey, Richard O. Loengard, W. I. McNeill, Frank Maguire, Adelbert R. Morton, William D. Neuberg, Dean H. Parker, Edward B. Payne, David E. Pierce, Charles D. Proctor, Kenneth C. Richmond, Robert H. Scannell, Gerald W. Thomson, Adolphe H. Wenzell. "After a few 'preliminaries' and the usual dinner, we settled down to the job of relating our past. This was the first time that the 1917 crowd has spent an evening together when an opportunity has been given to find out just what each man has been doing since he left Technology. We started in at one end of the table and spent the entire evening in listening to the various men. K. C. Richmond, who, by the way, is vice-president and treasurer of Abraham and Straus, Inc., of Brooklyn, said that this was the first meeting that he had attended of any Technology group since he left the Institute. He promised to repeat, having once broken the ice. Out of the 19 men present I think we could easily have started any kind of a business we might have wished. All in all, the boys seemed to have a good time talking about themselves."

1917 Continued

"The Stars and Stripes" (Italy edition, published in Naples) of December 16 contained an article, sent to us by Cac Clarke, Assistant Secretary of 1921, describing Italy's many artistic war casualties. Quoting in part from a long and interesting article: "When a soldier is wounded the medics take over. When a monument is hit the Doctors of Philosophy of the Fine Arts Section of AMG bandage the lighter cases with tarpaulins. The more severely injured are registered for eventual burial by the art historians. Through the hands of the Fine Arts Section pass some of the worst atrocities of the war: churches with their roofs blown off, palaces with their cupolas crushed in, museums with internal congestion, and libraries burnt down to the last appendix. Damage received by monuments occurs in three ways, according to Major Paul Gardner, director of the Kansas City Museum and now in charge of the most forward unit of the Fine Arts Section. While some buildings are unavoidable casualties of the war, others are destroyed more tragically by the Nazis out of revenge. Less serious but more frequent is the damage caused by thoughtlessness."

Henry Strout questioned the word on Jimmy Doon and obtained this official answer from Headquarters. "The following is the information you asked me for: Major James W. Doon of Henniker, N.H. left home last Christmas Day for Camp Custer for two months; Camp Reynolds, Pa., for two weeks; Fort Standish, Taunton, Mass. Arrived in England, London area, latter part of February, and presumably is still there in training. James Doon, Jr., is at Fort Knox, Ky., in Officer Candidate School. He has just graduated and is to have one month more of officer's training." — RAYMOND STEVENS, *Secretary*, 30 Memorial Drive, Cambridge 42, Mass. PHILIP E. HULBURD, *Assistant Secretary*, Phillips Exeter Academy, Exeter, N.H.

1918

First, an apology is due all members of the Class because I have not been able to get the notes in The Review for the last few months. Long absence from my job because of illness and death in my immediate family has been the cause. On my return to the office things were so rushed that I am only now getting them straightened out again. I am sorry and sincerely hope that I shall never again have to keep you waiting so long for news.

We have wondered about the first granddad of the Class. At Christmas Major Palmer Giles, from Mexico City, announced the arrival of a son on February 15, 1943, and a grandson on November 5. He claims title to the youngest son and the oldest grandson. I should like to hear from Monty Montgomery on this score, as I believe he should have been a granddaddy in September of last year. Let's try to find the first granddad. Palmer Giles reports that he and his two sons are all in foreign service at this time.

The latest marriage to be reported in the Class was on November 19, when Elizabeth Wilke of Two Rivers, Wis., was married to Albert F. Murray at Washington Cathedral. Dr. Murray is connected with the Office of Scientific Research and Development in Washington. — New honors have come to Mique Flett. To quote from a news dispatch: "Lawrence H. Flett, noted chemist and research worker of the National Aniline Division, Allied Chemical and Dye Corporation, has been appointed director of National Aniline's new products division." Good work to you, Mique. — A message was received from the wife of Charles F. Simpson, thanking The Review for sending copies to him. She had recently heard from someone who had returned from the thick of things that her husband, a major in an engineer aviation battalion, was at that time in the midst of it. Best of luck to him from his classmates. — Frank Creedon, who was for three years chief of the munitions plant administration, Office of Chief of Engineers, United States Army, and later with Bradley Dewey '09 as assistant rubber director, is now associated with Stone and Webster Engineering Corporation as construction manager. — Walter Russert of the Anaconda Copper Mining Company's staff at Butte, Mont., was promoted recently from foreman of the Belmont mine to assistant general superintendent in charge of the Orphan Girl, Emma, Travonia, and Oriental mines.

Earle R. Pickett, chemist, Army aide, Beech-Nut Packing Company official, and ex-mayor of Canajoharie, N.Y., died on November 6 in the Walter Reed Hospital in Washington, where he had been ill for two weeks with meningitis. He had been in Washington since September, doing special work for the Quartermaster General of the Army. — John T. Whitmore, prominent Boston architect and active member of the Eastern Yacht Club, died at his home in Marblehead on December 14. — It was not until the first of the year that we learned of the death of George M. Macheca last July 25 at his home in New Orleans.

As many of you know, our Class President is now back at his office at the Institute, and from what he says I think he is very glad to be back, for more reasons than one. On January 8 he was the speaker at the meeting of the New Haven Council of Girl Scouts. Early this year his latest book, *Balanced Personality*, was published, and it went into a second printing six weeks after publication. A condensed form of the book is coming out in a little magazine called *Your Life*.

Now to turn to the Alumni Dinner on February 26. I am very happy to say that we had the largest turnout for such an occasion that we have had for many years. It really seems that new spirit is being shown, which is very gratifying to the officers of the Class. Those present were Lester Conner, Raymond Miller, Jack Hanley, Paul Howard, John Kiley, Alan Howard, Eli Berman, Ned Longley, Fred Philbrick, Jacob Young, Carlton Tucker, Thomas Kelly, Bill Wills, John Kilgore, F. Alexander Magoun, and yours truly. — GRETCHEN A. PALMER, *Secretary*, The Thomas School, The Wilson Road, Rowayton, Conn.

1919

Our 25-year reunion will be held on July 28, 29, and 30, at the Norwich Inn, Norwich, Conn., near New London. The New York, New Haven and Hartford Railroad runs trains every hour on the hour out of New York and Boston; bus or taxi is available to the Norwich Inn on Route 32 from New London. Special transportation is being developed by the committee. Arrival time will start late Friday afternoon, July 28. The committee follows: Will Langille, Chairman; Bill Banks, Assistant Chairman; Tim Shea, Al Richards, Fred Given, Max Untersee, and Leo Kelley. A softball championship and golf tournament will be held Saturday afternoon, July 29, and a banquet Saturday night. Luncheons will be held in New York and Boston a week or two prior to the stag reunion for the benefit of the wives, who are not included in the main reunion. Notices have gone out during the week of April 10, and further announcements will follow. We are still in need of biographies and photos for the 25-year book. It is suggested that everyone bring his own golf clubs and golf balls and sports clothes, as well as cameras for the recording of local color.

Tim Shea wrote in regarding reunion arrangements at Norwich as follows: "I met Dawson, the manager, and have the following information: Ocean swimming is 12 miles away at New London (Ocean Beach). There is a fresh water lake 8 miles away; I don't know how good it is. There would be no embarrassment to the Inn if you want a couple of hired entertainers at the banquet. A softball field is beside the golf course. The liquor supply is expected to be ample, except for Scotch, which is getting scarce. On this basis you may not need to supplement as much as you had planned. I inspected a typical bedroom. It was well furnished and looked comfortable. The banquet room can take care of at least 60. A piano, etc., can be moved in. In case of a rainy day, card tables can be set up. The hotel has no better publicity material than that which they sent you."

Your Assistant Secretary, Al Richards, wrote on Easter Sunday from Chicago as follows: "I haven't much news for you. Last week I attended the American Chemical Society convention in Cleveland, and at the M.I.T. social hour I didn't meet a single fellow from '19 — only Howard Cyr '18, who is with New Jersey Zinc in Palmerton. This afternoon I tried to get in touch with Dick Cashin, but he must have been out Easter parading in the drizzling cold rain that we are experiencing today. I did talk with Benjamin H. Sherman over the telephone. He said that he was feeling well — has four children, two boys and two girls. He reported that he had seen Boley and Herzog at a recent meeting here in Chicago at which Prexy Compton gave a talk. I also said hello by telephone to Adolph Spiehler, who is kept pretty busy running the affairs of the Pure Oil Company here in Chicago. Both Ben Sherman and Adolph Spiehler would like to get to the reunion but are afraid business matters are too pressing at this time to make a trip East. I was out at the University of Chicago on Friday and had all good intentions of looking up Frank Hoyt, Associate Professor of Physics there, but was so pressed for time, because of another appointment, that I couldn't make it. I shall be in New York City on April 25–28 at the rubber convention and will give you a ring then." — Mrs. Donald W. Kitchin dropped a line to say that Don, too, expects to go to New York at the end of April for a convention.

Duke Herzog also writes from Chicago, where he is now with the Alfred Jacobs-

1919 Continued

hagen Company at 4419 South Ashland Avenue, in charge of buying and selling of raw stocks. His home address is 344 East First Street, Hinsdale, Ill. Duke says: "I met a number of the gang at the Technology dinner two weeks ago — Sherman, Cashin, Boley, Knox, etc."

Robert S. Bolan now resides at 19 Sheffield Street, Newtonville 60, Mass. — Oscar A. deLima is now a lieutenant commander. — S. Albert Kaufman's address is Rural Route 1, North Wilmington, Mass. — Robert R. Litehiser has been made a colonel, with address at 510 Grant Avenue, Fort Leavenworth, Kansas. — Jimmy Reis dropped a card from Palm Springs, Calif., where he has been vacationing. Your Secretary expects to see him on the Coast the latter part of April.

The following, dated March 20, was received by Mrs. Robert F. Morrison from Major General J. A. Ulio: "I have the honor to inform you that by direction of the President, the Legion of Merit has been posthumously awarded by the War Department to your husband, the late Lieutenant Colonel Robert F. Morrison. The Commanding General, Second Service Command, Governors Island, New York, has been directed to present the Legion of Merit to you as the next of kin, and your wishes relative to the date and place of presentation should be communicated to that officer. May I again express my deepest sympathy."

Ken A. Wright, who is branch manager of the Johnson Service Company at 1905 Dunlap Street, Cincinnati 14, Ohio, wrote in regarding the 25-year book. — George McCreery says: "I am in the process of writing a letter for the yearly Alumni Fund and hope that this fund does not interfere too seriously with your 25-year gift collections, or vice versa." — Dean K. Webster writes with regard to the 25-year gift: "I hope you have had good success with this effort. I will certainly plan to attend the class reunion and am looking forward to it very much." — Rod Bent sent in his biographic material for the 25-year book. He is president and treasurer of S. Bent and Brothers, Inc., and president of the Gardner Chamber of Commerce. His residence is 59 Prospect Street, Gardner, Mass. Rod has two boys, Gardner '45, aged 20, private, first class, and Jack '47, aged 18, seaman, second class.

Your 25-year reunion Chairman, Will Langille, who resides at Far Hills, N.J., is vice-president of the Diehl Manufacturing Company. He has five children: Eva 22, Helen 20, Winifred 14, Mildred 11, and Patricia 9. Eva is a trained nurse about to join the Army nurses, and Helen is married.

The 25-year reunion should be scheduled by everyone in the Class, as it is the big one. It has been arranged for a week end in the vacation period for the convenience of everyone, and Connecticut was selected as a central point. Save the date. Plan now to be there. Everybody out! — EUGENE R. SMOLEY, *Secretary*, The Lummus Company, 420 Lexington Avenue, New York 17, N.Y. ALAN G. RICHARDS, *Assistant Secretary*, Dewey and Almy Chemical Company, 62 Whittemore Avenue, Cambridge 40, Mass.

1920

To date I have not received any encouragement or inspiration in the way of letters containing suggestions or ideas on the big 25th reunion, which is going to creep up on us faster than we realize, since it is now only a little more than a year away. Surely you must have some notions as to where, what, how, and when. If so, now is the time to register them with your humble servant.

Henry W. Erickson, a captain in the Marine Corps, has left Quantico and is now in Washington at 3217 Connecticut Avenue, Northwest. Fred Fischer is now in Kalamazoo at 1400 Low Road. Benjamin West has left Philadelphia for Oceanport, N.J., address, Box 95. George Corr is in Cleveland, Ohio, at the Tudor Arms Hotel. José Geigel Pizá is with the Puerto Rico Water Resources Authority at Ponce, Puerto Rico.

No doubt you will note from other reports in The Review that the Class continues to monopolize the vice-president jobs on the Alumni Association. As Ed Ryer goes out of office, Al Glassett comes in. — HAROLD BUGBEE, *Secretary*, 7 Dartmouth Street, Winchester, Mass.

1921

Kenneth B. Skardon, I, a naval lieutenant, is one of the many men in service who have responded to our requests for letters. Ken says in part: "The war has changed the picture considerably for me and my family. My oldest boy, Yale '43, is now a second lieutenant, field artillery, at Camp Roberts, and the next boy is in England with the Corps of Engineers. I figured the old man (World War I, 1917 to 1919) should do something too, so I followed up invitations I had been receiving from the Navy's Civil Engineer Corps. When I did apply, they needed two-stripers so badly I took what they had, closed out the business in West Chester, Pa., packed up the household, wife, and 17-year-old youngest boy, and moved them to Springfield, Ohio, my original home, where they are near my mother. Then I went to Camp Peary, Va., to the Construction Battalion training center for four weeks Then I received orders to join a unit in the field and flew over in a PB2Y. I am commander of a company in the battalion, construction officer, ship's service officer, and deck court officer."

Bruce F. Rogers, X, of Rye, N.Y., was married on February 27 to Margaret Louise Auert of Utica, N.Y. They are making their home in Rye. Bruce is with the Aspinook Corporation in New York City.

Yssel Y. Young, VI-A, died at his home in Selina, Kan., on April 2. He was an electrical engineer with the Kansas Power and Light Company and a native of Junction City, Kan. He prepared at the University of Kansas and entered the Institute in our junior year. He was a member of Delta Tau Delta, Theta Tau, and Hexalpha. On behalf of the Class, our sincere sympathy is extended to his family and to his cousin, Frank Gage '22.

Daniel Noce, I, of Falmouth, Mass., is the fourth of the Class to reach the rank of major general. He is chief of amphibious operations in the European area and received the Distinguished Service Medal for organizing the amphibian engineers. With the promotion of Edgar Erskine Hume, VII, to brigadier general, announced last month, there are still ten of the Class in this rank. Walter E. Church, IV, a major in the Corps of Engineers, writes that he is regional utilities supervisor for that part of the Ninth Service Command which includes the states of Oregon, Washington, Idaho, and Montana. Walt is located in Portland, Ore.

Howard L. Vickery, XIII-A, rear admiral and vice-chairman of the United States Maritime Commission, has written the chapter on the commission which appears in a new book, *Merchant Fleets*, published by Dodd, Mead. A recent article in the New York *Herald Tribune* refers to Howard as "the boss of our shipbuilding program" and calls him "the unsung production genius of the American war effort." To justify this, the article points out that through Howard's efforts, the 210-day schedule on which ships were built in January, 1942, has been reduced to 55 days, and the fast Victory ship, which requires no convoy protection, has been produced as his answer to U-boats.

Donald H. Hatheway, VI, of the Boston Edison Company, collaborated in presenting a paper on "Improving the Performance of 110 Kv. Lines" at the northeastern district meeting of the American Institute of Electrical Engineers in Boston on April 19. Don also collaborated in preparing an article entitled "Expulsion Tubes Reduce Line Outages," which appeared in the April first issue of *Electrical World*. Donald B. McGuire, VI, chief engineer of the Rockland Light and Power Company, Middletown, N.Y., also broke into print in the same issue of *Electrical World*. Don's article, "Substation Frame on Tower Legs," has a cryptic title, but it really shows his ingenuity in using the base of an existing transmission line tower to build a new substation for doubling the power supply to a war plant and thus save material.

Recent civilian address changes include: Alexander D. Harvey, III, Dorr Company, Inc., 570 Lexington Avenue, New York, N.Y., and James LeGrand, I, 418 Ludlow Avenue, Cincinnati 20, Ohio. Mail for military personnel will be readdressed if sent to the Institute. — Longer days mean more time for those little things you have been putting aside to do later. Send in your Alumni Fund card now and make certain that you continue to receive The Review. Include a note on your doings for your Assistant Secretary. — RAYMOND A. ST. LAURENT, *Secretary*, Rogers Paper Manufacturing Company, Manchester, Conn. CAROLE A. CLARKE, *Assistant Secretary*, Federal Telephone and Radio Corporation, 591 Broad Street, Newark 2, N.J.

1922

Your Secretary's annual trip to the West Coast was hectic. Everything is crowded, transportation is worse than in the East, and it is next to impossible to obtain hotel accommodations even well in advance. And if one is lucky enough to have gasoline coupons, he finds that many of the gas stations have the "No Gas" sign out before noon. In spite of good intentions, I was able to see only two of our Class in Los Angeles, the only city visited. F. Marion Banks, Vice-president of the Southern California Gas Company, has plenty of troubles with the tremendously increased industrial and domestic load due to the war activities in Southern California, yet he found time in March to deliver an address to the West Coast Technical Conference on domestic

1922 Continued

gas research. Wes Hammond, Worthington Pump and Machinery Corporation's representative in Los Angeles, is very proud of the football prowess of his oldest son, Robert, who is now 17. Bobby Hammond was unanimously acclaimed by coaches and sports writers as the best all-high-school defensive back in football last fall.

Earl Eacker, Vice-president of Boston Consolidated Gas Company, was recently elected treasurer of the New England Gas Association. — On April 1, Hicks Atwell became superintendent of the New England Casualty Company's claims department. He entered the insurance business in 1927 with Maryland Casualty and was later with London and Lancashire Indemnity in Boston, and since 1929 he has taken charge of the latter's Springfield office. — Herbert Geyer, II, supervisor of the engineering department of Zurich General Accident and Liability Insurance Company in Philadelphia, broke into the news recently, when he recalled in public that he was born on January 11 in a house at 111 East 111th Street, New York City. We bet Geyer rolls a mean pair of dice.

I had a brief visit lately with our Class President, General Browning, in Washington, D.C., and he sends his regards to the Class. In spite of the tremendous volume of work which passes over his desk, Browning appears in excellent health and managed to get away from Washington for a few days' rest during the winter. — CLAYTON D. GROVER, *Secretary*, Whitehead Metal Products Company, Inc., 303 West Tenth Street, New York, N.Y. WHITWORTH FERGUSON, *Assistant Secretary*, Ferguson Electric Construction Company, 204 Oak Street, Buffalo, N.Y.

1923

Recent correspondence has brought to light the activities of a number of people who have not been recently mentioned in these notes. For example, J. R. A. Hobson, Jr., is director of public utilities, in Richmond, Va. He is in charge of the city gas, water, and electric street-lighting utilities. Dorothy Weeks is in the Office of Scientific Research and Development in Washington, a member of the technical staff of the liaison office which has the responsibility of exchanging information with the United Nations on technical research. Charles T. Burke is engineering manager of the General Radio Company of Cambridge, Mass., and according to a recent release by the company, a member of the firm's management committee.

Joseph H. Cox is mentioned in the Westinghouse *Engineer* for March, which relates that he joined Westinghouse on graduation, entering the service department in 1924. As a protégé of Dr. Fortescue, he went to California to study flashover characteristics and surge phenomena on the famous 220-kilovolt transmission line, then just completed. After several years of work in making field studies of lightning, he transferred his activities to the mercury-arc rectifier section, of which he soon became the head, the position he now holds. This section, the Westinghouse *Engineer* says further, has been important in the battle of light-metals production.

A little while ago I reported that L. J. Brooks had been sent to Salt Lake City with the Remington Arms Company division of the Du Pont Company. That plant is now closed, and he says he is back in New England with the Ekholm Associates, management consultants, of 31 Milk Street, Boston, Mass. He reports that while in Salt Lake City he and his wife had their first son.

Notification has come from the Alumni Office of the death on January 29 of Harold J. Acton, whose home was in Westmount, Quebec. — HORATIO L. BOND, *Secretary*, 457 Washington Street, Braintree 84, Mass. JOHN M. KECK, *Assistant Secretary*, 207 Bloomfield Avenue, Bloomfield, N.J.

1924

Following the receipt of missives verging on libel from Ed Wininger and Anatole Gruehr — the latter's bearing the seal of a notary — the Secretary has decided to come out of hiding, admit he is back in Boston, and produce such class notes as the contributions from members of the Class will allow.

From Ed's letter, the following is gleaned: "I got religion about the first of the year and have been going to the Technology Club of New York for lunch rather frequently. Not only is very good food to be found there, but John makes an excellent Manhattan. I was in Boston a few days and had a pleasant visit and lunch with Chick Kane." Ed writes on the letterhead of the Nicholson Company, 10 Rockefeller Plaza, New York.

Anatole, after giving his typewriter a hotbox from spelling out his opinion of the Secretary, came through with his usual interesting batch of news. "As an item of class news," he writes, "the Winingers, Keplingers, Schoolers, Hamiltons, Ed Jagger, and we-uns attended an open house at the Technology Club of New York. Since there was an opportunity for a visit from Dr. and Mrs. Compton, a big party was thrown for members and guests. After the class lines broke down, we mixed with some of the ancients of the Classes of 1923, 1922, and even 1921. Bill Correale is a major now, still in California. Greg Shea is apparently in Boston. Razzack, who was supposed to leave for India in March, has been delayed and continues to commute to Washington in the hope that arrangements for his trip may be completed soon. Bill Appleton, a lieutenant colonel, is rebuilding communications in Italy. George Arapakis is teaching at the College of the City of New York and is getting fat."

From Alumni Secretary Charlie Locke we have the following: "Ray Meade is now senior field representative in charge of the Birmingham office and the northern half of Alabama under the Department of Labor for the state of Alabama which was created in 1943. His last job was with the Du Pont Company for thirty months, starting in the spring of 1941 as construction engineer. At the beginning of 1942 he was made material engineer in charge of all maintenance supplies, material, spare parts, and construction equipment. At the beginning of 1943 he became project engineer in charge of all engineering, drafting, estimating, etc., which position he held until he resigned last December to take on his new job. His work with the Du Pont Company was at Childersburg Arsenal, and he was with them from the very beginning of the construction of that plant, which was some $140,000,000 investment. The plant made various explosives. One drawback on that job was that it was 50 miles from his home in Ensley and that he drove or rode 100 miles daily to work; several nights each week, also, he taught until ten o'clock, and incidentally slept a little in his spare time." — FRANCIS A. BARRETT, *General Secretary*, 50 Oliver Street, Boston 7, Mass. GEORGE W. KNIGHT, *Assistant Secretary*, 36 Arden Road, Watertown 72, Mass.

1927

Earlier in the year the Associated Press carried the following very interesting paragraphs about Sidney Waugh, who is an Army captain with the Allied Military Government in Italy: "Capt. Sidney Waugh of Amherst, Mass., an officer of the fine arts and monuments section of the 5th army allied military government, said today that about 80 cases of art treasures from the Naples National Museum including sculptures of Pompeii and one of the finest collection of bronzes in the world, had been stored in the monastery [at Cassino] by the Germans some six weeks before the allies entered Naples. Waugh is waiting to learn whether the treasures are still there. One report is that they were taken to Rome and then to Spoleto by the Germans. Representative works of Italian painters and the best types of Greek art also are stored in the abbey, although it has no particular protection against bombs and artillery. Capt. Waugh said that if any art treasures were still there he would take them back to Naples for a thorough checkup rather than to attempt to make an inventory at the abbey. Capt. Waugh would venture no guesses on the fate of the treasures but he recalled the disappearance of certain art treasures from the Louvre in Paris and observed that the Germans were 'scientific looters — they usually have an art expert present.' "

H. P. Ferguson has written as follows concerning an item in the April class notes: "My forecasting abilities have failed me miserably, I am afraid, for just after the article on Art Connell appeared in The Review for April, he spent a few days in Cleveland. He told me that he had finally decided to get married, so the Class has lost the one man I thought sure was fated to be a bachelor all his life. The fatal step will be taken sometime this summer." — Amos T. Akerman has been promoted to the rank of colonel. His headquarters are in Orlando, Fla. Bernard E. Manseau has returned from Pearl Harbor and is living in Washington, now a Navy captain. Ralph Johnson, still in Hawaii, now wears three full stripes.

Among the changes of address recorded this month is that of John Field. In undergraduate days, he was president of the Athletic Association and also of the Institute Committee. After graduation, he went into the telephone business and is still in it, judging by his new address, which is Mountain States Telephone and Telegraph Company, Phoenix, Ariz. Other new addresses are: Joseph L. Brady, Y.M.C.A., 136 West Main Street, Waterbury, Conn.; George C. Houston, General Delivery, Richland, Wash.; and Doria G. Letourneau, 284 East Drive, Oak Ridge, Tenn

Professor Schell of Course XV has recently circularized members of his Course in order to bring their biographical his-

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tories up to date. A carbon copy of this report by 1927 members of Course XV would give your Secretary a lot of interesting material. — Alf Berle has quietly concluded his most successful year as class agent for the Alumni Fund. The results were the best ever, with 74 per cent of the members making some contribution. In a recent letter Alf has expressed his thanks to the Class, and we take this means of expressing our thanks to him. — JOSEPH S. HARRIS, *General Secretary*, Aviation Department, Shell Oil Company, Inc., 50 West 50th Street, New York 20, N.Y. DWIGHT C. ARNOLD, *Assistant Secretary*, Stevens-Arnold Company, Inc., 22 Elkins Street, South Boston 27, Mass.

1932

While in Chicago on business I talked with Don Gilman on the telephone. His promised newsy letter has not arrived, but we hope to have it for the next issue. We have news from Tom Sears, a captain in the Chemical Warfare Service stationed at Headquarters Rocky Mountain Arsenal, Col. He writes: "Every month when I read The Review and note the paucity of class notes, I am reminded that I should drop you a line and give you my two cents' worth. I have seen Jerry Kellogg several times recently. He is a Chemical Warfare officer with headquarters in Colorado Springs. Through him I obtained Johnny Crowther's address. Johnny is now a major and at last report stationed in England. I had a brief note from him recently in which he suggested that I come over and join the war. Could be. From time to time I have bumped into other M.I.T. men, but none of our age and vintage. There are several Technology men stationed here, starting with Charles E. Loucks, who is a brigadier general and our commanding officer. None of the others was in school during our time. Any news is welcome these days, and I hope that you will again remind our Class that letters are welcome and that we all like to hear about the other fellow." — CLARENCE M. CHASE, Jr., *General Secretary*, 1207 West 7th Street, Plainfield, N.J. *Assistant Secretaries:* CARROLL L. WILSON, 1530 P Street, Northwest, Washington, D.C.; WILLIAM A. KIRKPATRICK, Allied Paper Mills, Kalamazoo, Mich.

1933

We have been waiting and waiting to hear from you people, but nothing has arrived. Won't you drop a line now and then with some recent news for this column?

We offer congratulations to our President, Dick Fossett, who became the proud father on April 22 of James Stephen. Dick is still adding his bit at the Procter and Gamble Defense Corporation, Milan, Tenn.

Did you know that Walter A. Shaw, a lieutenant colonel in the Army Reserve, is engaged to Grace Thompson of Washington, D.C.? And Alvah Raymond is engaged to Meredith G. Bragg of South Weymouth.

Ed Winkler, VI, recently joined the staff at the Institute to work on an important war research project. — That is all for now. Let's hear from YOU! — GEORGE HENNING, JR., *General Secretary*, Belmont Smelting and Refining Works, Inc., 330 Belmont Avenue, Brooklyn 7, N.Y. ROBERT M. KIMBALL, *Assistant Secretary*, Room 5-119, M.I.T., Cambridge 39, Mass.

1934

From our Assistant Secretary, Lieutenant Bob Becker, comes the following vivid screed, written in Italy. He has been getting around — but let him tell it:

"Most of you have noticed my name at the foot of our class notes during the past ten years and have probably wondered why there was no further mention made of my activities. I was last mentioned, I think, as having married the boss's daughter while working in Bolivia (except that we were married in Ecuador). That same boss's daughter is now the mother of a small daughter, born at Chuquicamata, Chile, on August 10, 1942. They are both doing well and are at present residing in Flushing, N.Y. The daughter's father, on the other hand, is existing on the Anzio beach head in Italy.

"It all began on October 4, 1942, when I was working at the Chile Exploration Company's mine at Chuquicamata, Chile. On that red-letter day I was handed two surprises. The first was a raise in pay and a long-awaited appointment to the job of assistant foreman of the operations division; the second was in the form of a red-bordered letter from the War Department ordering me to proceed from Chuquicamata on January 1, 1943, to Fort Belvoir, Va., and to report for active duty.

"I reported as ordered and spent a half day learning the new way to do right shoulder arms at a refresher course for officers. Luckily for me (because I'd surely have flunked out if I stayed) I was snatched away by an officer who interviewed and accepted me for the Special Service Force which was then training at Fort Harrison in Helena, Mont. He said that he wanted me because of my experience with demolitions, but — well, perhaps I was a little gullible.

"At any rate, I arrived in Helena on February 1, and six days later was adjudged both a qualified parachutist and a competent skier. Those six days will always remain in my memory as a nightmare. From dawn until dusk a Norwegian instructor racked his brain in an effort to co-ordinate my two unwilling feet, tangling with each other on those skis; and in the evenings I listened to lectures on jumping, watched training films on the subject, tried on parachutes and adjusted harnesses and jumped off five-foot-high platforms with my arms clasped over my chest. I made the two qualifying jumps on the fifth and sixth days without further preliminaries.

"A word about the outfit: It is a combined Canadian-American force specially trained to fight anywhere. The officers and men, all wearing the American uniform, are spread evenly throughout the force. Don't let the name fool you: We are not the boys who peddle books and radios and entertainment. Until recently the deepest secrecy surrounded us, and very few people, either in or out of the services, knew what our branch of service insignia signified. Of late we have been mentioned from time to time in the press as 'U.S.-Canadian troops.'

"After completing our varied training in the States, we shipped for the Aleutians and spearheaded the attack on Kiska. Need I say that the adventure, insofar as it was our baptism of fire, was a washout? We were nonetheless commended on our performance and headed home, only to be shipped almost immediately to greener pastures, namely Italy. Our record here has been one that has been paraphrased by many in these words: 'If you've got a static line and want to advance, send in the Special Service Force. They'll move that line for you.'

"If you don't believe me, get hold of your newspapers and turn to the period of December 1 to 9. That was the Mounts-Maggiore-Camino-Difensa push. And again from Christmas Day until January 19. That was the push up to Cassino from Mount Majo. On the other hand, we are now on the beach head, where we are doing as little pushing as anyone else.

"While taking one of the numerous hills that have been our objectives since arriving in Italy, I inadvertently got in the way of a German machine gun's line of fire. I'm glad it wasn't serious, because I hate to think of the litter bearers who might have had to carry me the ten miles I walked back to an aid station and finally reached a clearing station.

"But after the first few miles, I did have a rather tough time because I had been hit in my right elbow, right knee, and the left thumb. To be sure I'm all right again, though I have some trouble in trying to thumb my nose at anyone with my left hand, since the doctors who had me on the table at the evacuation hospital decided that the thumb was a superfluous appendage.

"That should bring us up to date, and now that you know where I am, how about some of you fellows writing to tell me all your doings? Speaking of doings, there's nothing I'd like better than to be at our 10th reunion this year, but I'm afraid that the Army wouldn't see eye to eye with me, should I ask for leave to go home at this point." — JOHN G. CALLAN, JR., *General Secretary*, 184 Ames Street, Sharon, Mass. ROBERT C. BECKER, *Assistant Secretary*, 169–49 24 Avenue, Flushing, N.Y.

1937

The recent letter that went out to our Class reporting on the Alumni Fund year just ended expressed the hope that you brethren would take time out and drop the latest news to our struggling class notes. So far the results have been right encouraging, with letters from Harry Goodwin, Conover Fitch, and Jack Simpson.

Harry Goodwin is now a major serving in parts unknown and on April 12 wrote as follows: ". . . You may remember our meeting in New York some months back. Apparently it was not long after that that the Navy got you. How do you like it? I trust it's agreeing with you. As you know, I was stationed at Aberdeen Proving Ground, where I had been since I was called to active duty in February, 1941. During the entire time there I was engaged in various phases of training ordnance soldiers on duty at the ordnance replacement training center.

"For a little over a year I was in charge of the small arms school there, training armorers for maintenance of small arms in the field. For the last few months at Aberdeen I was personnel officer of the technical division of which the small arms school was a part, along with schools in nine

1937 Continued

other ordnance specialties from artillery to clerks' training. I was promoted to major on November 1, 1943. In January I got my orders for overseas and left Aberdeen on February 8. At present I am not allowed to tell you where I am or what I am doing but may be able to send you more news later. At Aberdeen I saw Walt Blake and Jack Robbins frequently, but I've pretty well lost track of other members of the Class, as the Army has kept me too tied down to get around much. I'm still in the status of a married man with no children. Give my regards to any of the boys you happen to see, and maybe we can get together again after the war. In the meantime, take it easy."

Conover Fitch sent a note on April 5 from Maine, where he's busy upholding the virtues of both the Navy and the Institute. He writes: "Glad to see you are wearing the same uniform, and I wish you the very best duty. In another ten days I shall have rounded out three years of active duty with the Civil Engineer Corps of the Naval Reserve, and a very busy and interesting time it has been. My duties have taken me up and down the eastern seaboard in various capacities, but at present I am proud to be a part of one of our construction battalions. The Seabees are a grand outfit, and we are raring to take on new jobs. I have not been able to keep in touch with many of the Class, but you will be glad to hear that Carson Febiger, who is also a lieutenant in the Civil Engineer Corps, has just arrived home after an absence of 23 months with a Seabee detachment in the South Pacific. When he got back, he met his small daughter for the first time, which was quite an event. For your records, my permanent address is 211 Willow Road, Nahant, Mass. There is nothing truly permanent in the Navy, as you have no doubt learned."

It's been many a moon since we've heard from Jack Simpson; so the following word, dated April 3, is mighty good to get. Jack says: "This is my first contribution to the 1937 files, but even so I don't have much news. Out in this neck of the woods Technology is pretty much of a legend and ex-Tech men about as plentiful as new tires. It's nice to read about old chums, though, so I hope you will have many other new converts this year. For the record, I have been married for 16 months and have since acquired a house, a more-than-slightly-used furnace, and a large assortment of debts, and (for the present, at least) a IV-F draft classification. My chief link with Technology days consists of letters exchanged about twice a year with Leo Avondoglio. Since the Rabbit now has two children, he has doubtless written you at least twice. If not, it's probably the paper shortage. The one week end I got away from work last summer was the one that Dana Devereux '36 stopped in Muncie on his way to the Coast. About a year and a half ago I almost ran into Jerv Webb in Detroit. And there is the sum total of Tech reunions I have enjoyed. I am glad to hear that as a Class we're doing well and hope we can keep it up. By the way, Phil, I should like to hear some news of Dick Young. Since he was an old Sigma Nu brother, you may have some extra-curricular activity on G. Richard. Or does everything go into The Review hopper? . . ."

In answer to Jack's query regarding Dick Young: At last report he was up to his neck in work for the Westinghouse Lima division in Lima, Ohio. His home address in Lima is 325 South Jameson Avenue.

Around the first week in April a very official-looking document arrived in the mail. It purported to be an extract from special Army orders issued by Dan Cupid and announced the forthcoming marriage of Walt Blake to Susan E. Stoll, a captain in the Women's Army Corps. Apparently the deed was done, for several weeks later formal announcement of the marriage arrived. It took place at Aberdeen Proving Ground, Md., on April 19. Lots of happiness, Walt, to you and your fair bride. The fact that Walt is a major in the Army and his bride only a captain should help him keep the situation under control.

Dave McLellan has been back in Boston for a number of months now, after trying to talk himself out of the IV-F classification into some branch of the armed forces. He's doing research at the Institute and also taking some courses there. The Navy seems to have a habit of planning things to keep yours truly busy on those evenings he is supposed to function as 1937 class representative at Alumni Council meetings; so Dave is carrying on at the meetings with Ensign Peters showing up when, as, and if he can.

Those of you who know Brent Lowe '36 will be interested to learn that he's a lieutenant, junior grade, in the Navy and finding his assignment quite interesting. At this writing, he's in Boston on extended leave. A week ago he was scheduled to come out to Wellesley Farms of an evening to visit the Peters clan, but instead came a telephone call announcing that Brent has the mumps on both sides. The Naval Hospital is quite secretive about the whole thing but does admit that temperature is normal.

Do let's have more letters, fellows — we all like to read The Review and learn what's happening to the other fellow, but we can't unless he writes in about it. — WINTHROP A. JOHNS, *General Secretary*, 34 Mali Drive, North Plainfield, N.J. PHILIP H. PETERS, *Assistant Secretary*, 159 Glen Road, Wellesley Farms 82, Mass.

1938

A beautifully engraved announcement came to us recently, written in Spanish and postmarked "la Ciudad de la Habana." It appeared quite important, but didn't convey a great deal at first except for the one word, "matrimonio," which was a pretty good clue. After an hour's study, with some help from outside, we pieced together the news that Hector Hoyo was married to Margarita Dediot Montane in Havana last April. Congratulations, Hector! We hope and trust our translation is correct. — We have also heard that Sid Baron was married on January 30 to Florence Lazarow at Norwich, Conn. Sid is a lieutenant, junior grade, stationed at New London.

Fred Reuter writes that on April 12 the stork brought him a wonderful little girl, whose name is Gretchen Anne. This is his second child, his first being a boy, Fred W., the third. Fred is living out in Cleveland and is working with General Electric at the Nela Park plant. He writes: "Other than being in imminent danger of the draft and having just had notice from our landlord to get out because he wants to move in, we're all in fine spirits and good health."

Norm Bedford, who went with Bethlehem Steel when he was graduated, has recently left the steel company to go into his father's business in Boston, the Beckwith Elevator Company. We should say that that would be a good business in which to go up. — In the Boston *Traveler* last March, in a column entitled "Gracious Ladies," there was a quite flattering article on Kentaro Tsutsumi's wife. They are living in Auburndale, Mass.; he is teaching special classes at Tufts College, and they are the proud parents of a four-month-old son.

We get a few very interesting letters from some members of our Class; but for the most part, no one thinks of writing his Secretary and keeping his Class posted on his whereabouts and activities. Let us hear from you, so we may all know your good news. — Dale F. MORGAN, *General Secretary*, Carbide and Carbon Chemicals Corporation, 30 East 42d Street, New York, N.Y. ALBERT O. WILSON, JR., *Assistant Secretary*, 32 Bertwell Road, Lexington 73, Mass.

1941

Reid Weedon, writing from the South Pacific, gloats over the fact that the censor will not allow a more extended discussion of events and Technology men. At the same time Reid told of meeting Bill Schubert and Arnold Mengel quite frequently, and on one occasion John Van Riper — when the entrance of cheese and crackers into the room cut the correspondence short.

We happened upon the second member of the Meyers-Mengel combination in the Union Station, Washington. Warren is located in East Orange, N.J., but now and then manages to run into the Washington group of Tech boys, among whom are Dick Muther and Ted Guething. Standing at the same spot, we met Tom Gouzoule '40, whom most of us remember as a Nautical Association stand-by. Tom is at the Institute doing research work. Irv Stein was seen wearing an ensign's uniform and taking in a Wellesley prom — the lads stationed at the Institute are doing their best to keep up home morale.

I bumped into Bud Ackerson wandering through the streets of Philadelphia in search of an alarm clock. Hardly expecting to find one, I joined Bud anyway to learn what had taken place in the younger Ackerson brother's life since June, 1941. (Al was in the Class of '40, if you recall.) Bud spent quite some time in private industry before joining up last year with the Ordnance Department. He is now handling instruction work in antiaircraft batteries for the Ordnance field service.

Frank Storm, a captain in the Ordnance Department, who has just returned from an eight months' mission in Moscow, got into print again when his engagement to Helen M. Bolton was announced — best wishes, Frank. Best wishes also go to Helen Shaver and Jim McNitt, recently engaged, as well as to Jean Dennett and Ed Kispert, an ensign.

Carl Stewart, who has acquired more seniority on the trans-Iranian railway than he has on the Pennsylvania, is quite interested in hearing a bit of news from the three captains, Joe Myers, John Brannan, and Bob Williams, from Bill Babcock, Harry Heimer, and other hard-working

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Course II men. We should appreciate hearing from Course II, at that.

Captain Ed Monroe, out at Jeffersonville Quartermaster Depot, handed us a note from Rog Finch, also a two-bar G.I. at Jeffersonville. It was about Leon Crane. It appears that Leon was the last of a crew to bail out of a plane over the Alaskan wastes. As far as is yet known, the other members of the crew did not survive. Leon, meanwhile, found his way to a well-stocked cabin and proceeded to play hermit for 84 days. Upon his rescue Lieutenant Crane was decorated by the Army Air Forces, so read the note. Upon returning to Philadelphia, we noted Crane's name in the register at the Officers' Club, entered a day or two before. Assume then, that he has recovered from that long stretch. — STANLEY BACKER, *General Secretary*, 46 Bicknell Street, Dorchester 21, Mass. JOHAN M. ANDERSEN, *Assistant Secretary*, 136 Beacon Street, Boston 16, Mass.

1942

Although mired in Army Air Forces training somewhere in the Southwest, your Secretary still seems to move around too fast for the mail to catch up — or something. Anyway, except for a snappy letter from our Class Agent (hint! hint!), this month's mail evades the ultrafine-tooth comb.

From Boston, a desired but unattained point in your Secretary's itinerary, comes word of Jack Briggs, who has been making a hermit of himself working day and night at the Institute, and he a married man! Jim Girdwood, a lieutenant in the Marine Corps Reserve, is also in Boston with his wife, studying electronics subjects. Johnny Ewing, as a lieutenant, junior grade, may well have been aboard one of our carriers that has made landings easier in the South Pacific, as may Ensign C. L. McGinnis, who is probably more of a terror with a TBF than with his gray Ford. He'll miss the joys of Harvard Bridge at 5:00 P.M., though. Captain Curt Buford was last seen in New York. How about that?

Once again we have news of a classmate serving abroad whom we shall not see on Alumni Days to come. Bud Reed, II, first lieutenant in the Signal Corps, died on February 16 after a short illness while he was on duty in Europe. Bud had been overseas since August, 1943. Brother Delta Tau Deltas saw Bud during some of last year, as he was taking electronics work at Harvard and at the Institute. Bud was well remembered for his work on the Interfraternity Conference and as a member of the *Voo Doo* staff for four years. Bud was also one of the more faithful contributors to these class notes. Bud's face will be sorely missed at '42 gatherings to come, but not forgotten — that's for sure.

From Bob Ely, of whom we have heard little since the Sicilian campaign, comes the report that he is now back in the States with the Field Artillery at Fort Sill, Okla., after 16 months overseas. It appears, however, that his return was prompted only in part by military reasons. On February 26 in New Britain, Conn., Bob and Virginia Corning said those all-important words, and another bachelor's career became history. From Austen Lake, overseas correspondent for the Boston *American*, comes word of Bob Krucklin, a lieutenant in the Army Engineers, who at this writing is working with heavy equipment in England.

The home front seems still to be the major publicized activity of fellow classmates. As rumored several months back by that old trusty, Heinie Shaw, Jacques Shaw and Edna Mangan (better remembered at social functions as "Muffin") were married in Hartford, Conn., on February 19. Jacques was with United Aircraft there before joining the armed forces. Doubtless many classmates from the area took part in the gala occasion. Carl Trexel and Ann Sacks in January announced intentions for a similar ceremony. Carl a lieutenant, junior grade, was then stationed on the West Coast, and no date had been set. Marvin Stein, a lieutenant in the Army Signal Corps, was married on January 23 to Dorothy Bloomberg in the first wedding ever held at the Boston Center for Adult Education. Their honeymoon was in New York; their present location, censored or something.

Herbert Howell, experimental engineer with Wright Aeronautical Corporation in Paterson, N.J., and Carol Eckert, a 1943 graduate of Wellesley, have also announced their wedding-to-be. Clinton Cook and Alice Fisher, now at Colby Junior College, are planning a future together. Dick Malone, now a senior at Medical School, University of Pittsburgh, and Patricia Burkhalter, also attending classes there, set up housekeeping together a short while back.

A strictly naval engagement on friendly terms is the announcement that Bob Ingram, a lieutenant in the Naval Reserve, and Mary Griffith, a Wave assigned to the Naval Air Station at Anacostia, D.C., intend to join forces in the future. John Sheetz, a lieutenant, junior grade, now overseas, and Jane Gowans of Honolulu give promise of more collective news in the future.

So that's all. There are many from whom your Secretaries have not heard in a long time, and quantities of others about whom information is a vacuum. While this Army game teaches your Secretary to be quite proficient at waiting, still it is not recommended that he write fairy tales in the interim. Besides, the "real quill" is what we want, anyway: Let's not grope for the dope, let's be flush with a rush! — FREDERICK W. BAUMANN, JR., *General Secretary*, Orchard Lane, Golf, Ill. KARL E. WENK, JR., *Assistant Secretary*, 228 Marlborough Street, Boston 16, Mass.

1943

It is again my most unhappy duty to have to record the death of another member of the Class who was in the armed forces. Thomas E. McGrath, an ensign, was killed in action in the Pacific on January 29. He was pilot of a torpedo bomber. We extend our deepest sympathy to his family and friends.

The mail bag has brought a lot of news my way this month, so here it is. From Bill Terry comes the following: "Just before graduation I was transferred from Engineer Reserve Officers' Training Corps to the Air Forces and went to Officer Candidate School at Miami Beach, starting there on the 6th of March. Then followed the usual three months' grind of drill and class, marching and bracing. Finally it was all over, and I got those golden bars on the 29th of May. I was then sent to Winston-Salem. Bob Reebie was there too. He had had just about the same experience as I had.

"I don't know how much you know about some of the other fellows I know, so I'll send along what I have. Jack Thoerle is an ensign, spent the spring at Technology in the engine lab, and the last I heard was at Norfolk. Morrie Seiple, II, is at the Naval Research Laboratory in Washington, D.C. Bill Cochran went to Officer Candidate School with me, then left after a few weeks to accept a direct commission in the Marines. The following fellows were also at O.C.S. with me. Bill Katz, my roommate, went to Wright Field, as did Chuck Burnham and Gage Crocker. Rollo Grandgent went to the Proving Ground at Eglin Field, Fla. Willie Laird is supply officer of a bomber squadron and was last heard from at Myrtle Beach, S.C.

"As time passed, the battle of Winston-Salem progressed favorably. I was finally promoted about Thanksgiving time. The first of December, I was sent to Patterson Field. I'm actually doing aeronautical engineering work. We do trouble-shooting in the interest of flying safety. Anyway, when anything of an engineering or theoretical nature comes up, I'm the fair-haired boy. I get an opportunity to work on every type of army aircraft, and it is really an education. Wright Field is only five miles down the road. That is like an annex to the Institute, so many Tech men are there. As I mentioned above, Bill Katz, Charlie Burnham, and Gage Crocker are at Wright, also Jake Courshon and Bill Moulton. Ben Muzzey is a civilian engineer for the aeroproducts division of General Motors here at Dayton, and about a month ago, I met Art Graham, who is a ferry pilot in the Air Transport Command. In November, Bob Reebie left Winston-Salem to go to flight training. At last report he was in Clarksdale, Miss., in primary school."

Virgil Otto has sent in a veritable police report of the whereabouts of some of the Class: "I met Steve Heller on an Indianapolis-to-Chicago train about a month ago; he's a lieutenant in an antiaircraft unit. Bob Meissner is still at Douglas in Park Ridge, Ill. Jack McDonough is a lieutenant in the Engineer Corps and is now abroad. Barret Russell is down in Baton Rouge, La., working on high-octane gas for Standard, I believe. Frank French is a prospective ensign at Ward Island, Corpus Christi, Texas, studying radar. Jack Sibley is still pouring over the books at the University of Chicago medical school. Don Moll is at the American Manganese Steel Company in South Chicago. George Musgrave and I are still here in Indianapolis."

Steve Heller writes: "We are still in this country somewhere on the East Coast, not New York, which is all I can tell. From the address you can tell we shall not be here long. (Steve has an A.P.O. number.) You know as much as I do now. I laugh with glee when I hear that some of the boys are going to Tennessee. I spent some three months on maneuvers down there, and it is a real joy. Of course I was down there in the late fall when there was frost on the ground every morning, but those boys may get there in the spring and watch

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the flowers bud and stuff. Let me remind them that the Commanding General of the Second Army (General Fredendall) is an old alumnus (1907) and that if anyone tries to insult or complain about the Second Army, they should stick up for our side. I ran into Virgil Otto in Indianapolis. He is working with George Musgrave at a Naval Ordnance plant. He is quite the big executive. I also met some girls who worked under him, and they said he was the real stuff."

I shall give the mail a break for a while and see what the marriage department has to offer. We hear that the former Janet Haines is now Mrs. Haven Fifield, while Mary Mitchell and Elgar Pennington are now Mr. and Mrs. Pennington. Ensign Fred Allardt and Katharine Hexamer were married recently. The list of those who have declared their intentions is so extensive that it is best to record the names without more ado. The engagement of Susette Silvester and Allen Kirkpatrick 3d is announced, and we have heard that Beatrice Barker and Sid Hall are all set to take the final step. Barbara Batchelder and Irenée du Pont, Jr., are engaged, as are Pat Durbin and Bob Anderson. Claire Richter is soon to be Mrs. John O'Meara, and it won't be long before the wedding march plays for Suzanne Foster and John Shutack.

A short note is at hand from W. Kaneb, who says: "I've managed to get a hop to Boston and visited Technology for a few hours only, as I had but one day in Boston. It was good to smell Cambridge again — I never thought I'd get to like that Cambridge odor. I've got a nice job here. I'm an engineering officer on the main-side. I work out of the main engineering office and visit the outlying fields. There are six of them. It is a sorry job to listen to the troubles the squadrons are having with their airplanes and to report it into the main office for corrective action and advice. I see about everything that can happen to an airplane. I've met I. Richmond '16. An ex-architect from Boston, he is now a lieutenant commander and administrative officer for the station. He was a pilot in the Navy during the last war after he had finished at Technology."

Ed Ernst is at Del Monte, Calif., and has sent back some news of the lads. He says: "Larry Stumpf (Rod to the Technology crowd) and Wally Dunn are living together in Los Angeles and working in the engineering department at Douglas Aircraft. Larry expects to enter the service soon, according to my last information. Morris Rosenthal is an ensign in the Navy and is at present studying at the M.I.T. Special school. He was married in April, 1943, to Doris Reiser of Malden, Mass., and is expecting to be a father sometime this summer. As for myself, I am in the third month of a 14-month course in radio material and electrical engineering. The course leads to a petty officer rating of radio technician, second or first class, or aircraft radio technician, second class."

News has arrived of Bernard Dale, who is also on the West Coast. About two months ago he left the Lockheed Aircraft Corporation and began work with the Shell Development Company at the Wilmington, Calif., refinery of the Shell Oil Company. He is one of 20 engineering graduates engaged in pilot plant operation, and he finds that he is using his chemical engineering training to much better advantage in this job.

In the very bottom of the mail bag we have a few brief words from Stan Porosky. "Almost a year has passed since I last wrote, so once again I think it appropriate to drop a line. Much has happened during the past year. My expected trip overseas never materialized, but I have traveled about 3,000 miles around this country. At present I am at Camp Murphy in Florida. There are enough Tech men around here to form an Alumni chapter. They include several from our Class, Schwarzmann, Bob Lind, Lehr, and others."

So classmates, until next month — be good, and keep on sending me the whereabouts, travels, and scandal on all the members of the Class whose ways cross yours. — CLINTON C. KEMP, *General Secretary*, Barrington Court, 988 Memorial Drive, Cambridge 38, Mass.

1944

Another month, and another deadline, but still not much news — how about a few letters from you birds?

On the romantic front, we hear that Art Karol, now in Officer Candidate School at Camp Davis, is engaged to Marjorie Warren of Cleveland; Gordon Smith is engaged to Beverly Bushnell; Mal Kispert, to Janice McCreery; and Ed Jonash was married in April to Marie Schmitt. Congratulations!

The number of civilians in the Class is gradually decreasing, as our Uncle Sammy seems intent upon claiming priority on the services of all males under 26. Al Madwed has received his commission as an ensign in the Naval Reserve and expected to report to Princeton on May 25. Among others commissioned as ensigns are Dick Hatfield, Austin Dodge, Bob Marr, John Wald, Pete Rinaldo, and Dick Maconi. Also in the Navy is Greg Zararian, now at sea after having spent six weeks in "boot camp" at Sampson. Gard Sloan is also in the Navy via the draft board, and your Assistant Secretary expects to be along with him by the time you read this.

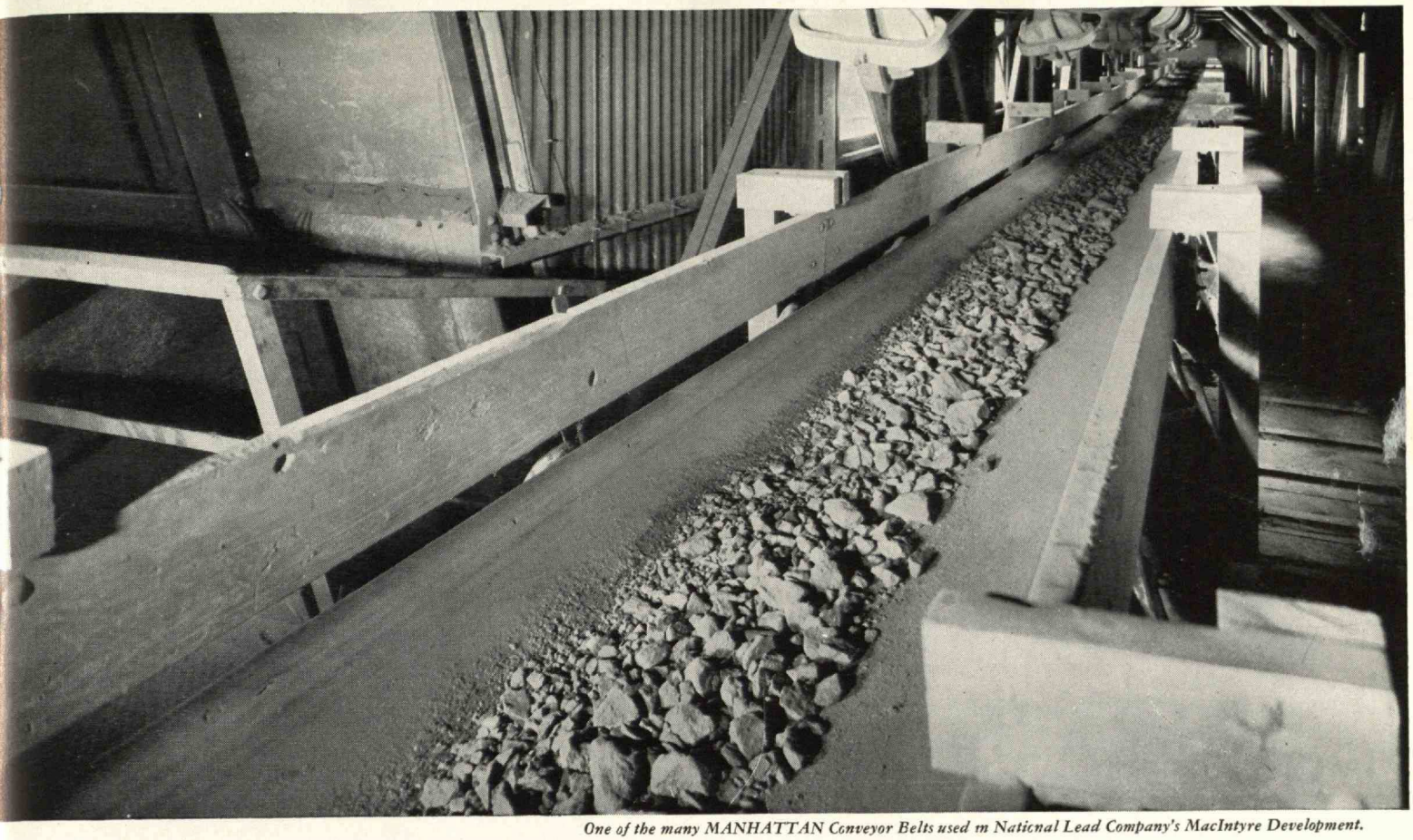
Back at Technology, many members of the Class are still studying, expecting to get degrees in June. Among them are Jim Baker, Ray Jerome, Wilson Gilliat, Jack Littleford, Herb Knape, Bill Wynot, and Ed Eaton. From Ed we learned that Ray Gamundi, Bert Picot, Sam Taylor, and Bill Ritchie are also still at school, Bill having returned this term after receiving a medical discharge from the Coast Artillery. He's staying at the Sigma Chi house and still hoping to get back into the Army. Ed Eaton has been working overtime these last two terms and hopes to get his master's, as well as his bachelor's, degree in June. He says that Al Michaels, Bernie Rabinowitz, Norm Callner, and the other Chemical Warfare boys are getting along nicely at Officer Candidate School and like it much better than basic training. Marty Wunsch was in the Army Specialized Training Program at Cincinnati when last heard from, and Johnny Spalding was also in A.S.T.P. Stan Warshaw and Jack Germer were both trying to get in the Navy. Thanks for the news, Ed.

Bill Scott, writing from Belvoir, says the fellows there have been busy of late, just completing two weeks of guard duty in addition to routine classes. Bill says: "The first group of M.I.T. men to graduate from Engineer Officer Candidate School got their second-lieutenant bars on May 17. They are John Floden, Dick Garrard, Dick Cavicchi, Marty King, Norm Knapp, Henry Lawton, Dave Blattner, and Fred De Bell. Bob Plachta graduates from Coast Artillery Officer Candidate School at Camp Davis on May 4. He will be a second lieutenant and plans to stop at the Institute for a few days on his furlough. Ralph Lamade will also be graduated with Plachta from the antiaircraft school. Bill Schlegel is now at Marine boot camp at Parris Island. On completion of this preliminary, he hopes to drop into Quantico to enter Officer Candidate School. Ed Peterson, Jim Gavin, Bob Sullivan, and the other Technology men who went into the Air Corps O.C.S. at Miami will be ready for graduation in about six weeks. I haven't heard anything about the Ordnance or Signal Corps men."

Andy Vallone, in the Navy, writes: "I was really glad to have 1944 graduated, even though I wasn't with it. My postwar job will be to complete my Course. At present, I am taking some advanced fire control courses in the fire control school here at the Washington Navy Yard." — Larry Dowd, in Officer Candidate School at Aberdeen, writes: "Bob Coleman, Harry Robinson, and Jack Breen all seem to be doing all right, but I don't see them often. I've heard from Johnny Feroli down at Fort Benning. He and Sammy Losco are having a rough time down there, taking an eight-week pre-O.C.S. course that sounds tougher than O.C.S."

We saw Ernie Schoenwald recently. He was working for Holtzer-Cabot Electrical Company in Boston, while awaiting word as to a Navy commission. He gave us the following news about Course X boys as he last heard of them: Jeff Robillard was at Columbia, preparing to be commissioned as a deck engineer; Bill van Ravenswaay was in Texas; Bob Thiede, working for the Standard Oil Company of New Jersey; Stearns, Docal, and McGarry, doing graduate work at Technology; Page Ufford and Dick Braendle, working for Du Pont, with Laredo also planning to work there after a visit back home in Cuba. Other news from Schoenwald is that Gardner Alden has been drafted but is still hoping for a Navy commission; Clyde Snyder, now an ensign, is studying at Harvard; Dick Soderberg is at Notre Dame, and Henry Bowes at Cornell; George Fotieo is expecting the draft to catch up with him soon; and Miles Coverdale is doing research work for an aircraft company in Texas.

Paul Slepian and Bob Arnold are working in the Radiation Laboratory. Seth Bransby, now an Army lieutenant, already has an A.P.O. address, care of Postmaster, New York City. Harry Schnitzer left school before graduation at the beck of his draft board. From Aberdeen he writes: "At present I am undergoing basic training, with two out of six weeks behind me. After this phase of training is completed, I am scheduled for instrument repair training, unless I can get a transfer to some other branch of Ordnance where the work would be more suitable. This basic training is rough, but would be bearable if a fellow could get enough sleep. To add to the discomfort, the weather here has Boston's beaten for sudden changes in temperature, and colds are very prevalent. The men in my barracks are mostly over 30 years old. Our training includes a little of everything, with emphasis on drill and rifle instruction. We have the usual obstacle courses, gas mask drills, and so on. During the coming week we shall undergo the infiltration course, where we crawl on our bellies for 100 yards under a cover of machine-gun fire. It's a great life, but how I'd like to be back home as a civilian!" Shouldn't we all? — WILLIAM B. SCOTT, *General Secretary*, Officer Candidate School, Fort Belvoir, Va. JAMES E. GALLIVAN, JR., *Assistant Secretary*, 430 Adams Street, Dorchester 22, Mass.



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